New Products

Linear Gages / Gage Heads

LGH (0.01 / 0.005 µm resolution)

Refer to page G-11 for details.

Laser Scan Micrometers

LSM-6902H

Refer to pages G-32 for details.

G

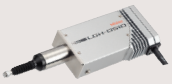
Linear Gages

Mu-checker

Laser Scan Micrometers

INDEX

Gage Heads / Display Units

	Measuring range / Resolution	Gage Heads				
			5 mm	10 mm	25 mm	
Incremental	0.000005 mm (0.005 µm)	**LGH** Series Page G-11		**542-720** **542-721** (Low measuring force)  Pages G-11 and G-12		
	0.00001 mm (0.01 µm)	**LGH** Series Page G-11		**542-715** **542-716** (Low measuring force)  Pages G-11 and G-12		
	0.0001 mm (0.1 µm)	**LGB2** Series (nut clamp) Page G-6 **LGK** Series Page G-5 **LGF** Series Page G-8	**542-246** Page G-6	**542-158** **542-181**  Pages G-5 and G-8	**542-182**  Page G-8	
	0.0005 mm (0.5 µm)	**LGK** Series Page G-5 **LGF** Series Page G-7		**542-171** **542-157**  Pages G-5 and G-7	**542-172**  Page G-7	
	0.001 mm (1 µm)	**LGK** Series Page G-5 **LGF** Series Page G-7		**542-156** **542-161**  Pages G-5 and G-7	**542-162**  Page G-7	
		LGB2 Series (nut clamp) Page G-6	**542-244** Page G-6	**542-262** **542-262H** (High accuracy) **542-264** (Low measuring force) **542-270** (Air drive) Page G-6		
	0.0005 mm (0.5 µm)	**LGF** Series Series with reference point mark Page G-9		**542-174**  Page G-9	**542-175**  Page G-9	
	0.001 mm (1 µm)	**LGF** Series Series with reference point mark Page G-9		**542-164**  Page G-9	**542-165**  Page G-9	
Absolute	0.01 mm (10 µm)	**LGS** Series ABSOLUTE™ Page G-10		**575-303**  Page G-10		

Gage Heads		Display unit		
	50 mm	Point measurement	Calculation measurement (addition and subtraction)	Multi-point measurement
		Dedicated counter (sold in sets with Gage Head)  SENSORPAK		
		EG Counter 542-015  Page G-13 **EB Counter 542-092-2**  Page G-14 **EH Counter 542-075**  SENSORPAK Page G-15	**EH Counter 542-071**  SENSORPAK Page G-15 SENSORPAK : Compatible with Measurement data loading software SENSORPAK. Refer to page G-18 for details. 	**EV Counter 542-063**  SENSORPAK Page G-16 
	542-173  Page G-7			
	542-163  Page G-7			
	542-176  Page G-9	**EG Counter 542-017**  Page G-13 **EB Counter 542-094-2**  Page G-14	**EH Counter 542-073**  SENSORPAK Page G-15	**EV Counter 542-067**  SENSORPAK Page G-16
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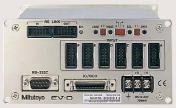
		EC Counter 542-007  Page G-13 **EG Counter 542-016**  Page G-13 **EB Counter 542-093-2**  Page G-14	**EH Counter 542-072**  SENSORPAK Page G-15	**EV Counter 542-064**  SENSORPAK Page G-16

Measurement data loading software for EH, EV, VL
SENSORPAK

Linear Gages

Ideal for integration into harsh environments such as automation applications

LGK
SERIES 542 — Slim type

G

- Compact model offers the vibration/shock resistance of the proven **LGF** Series. Cross-sectional area is approx. 1/5 compared to **542-181**.
- Resolution of each model can be selected from 0.1 µm, 0.5 µm, or 1 µm.
- Excellent sliding durability improved to remain serviceable for at least 15 million cycles (in-house testing).
- Excellent shock resistance, 100 G/11 ms (IEC 60068-2-27)

542-158

542-157

542 -156

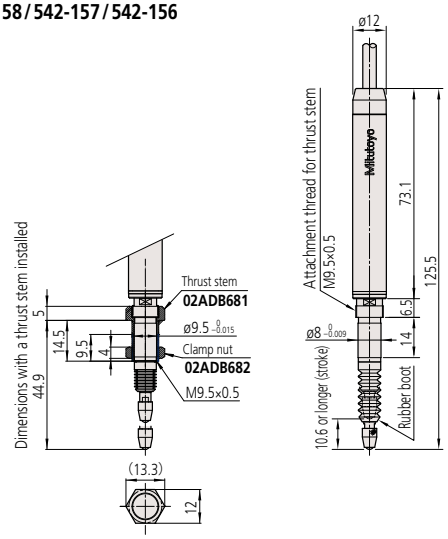
SPECIFICATIONS

Order No.		542-158	542-157	542-156
Measuring range		10 mm		
Resolution		0.1 µm	0.5 µm	1 µm
Measuring accuracy (20 °C)		(0.8 + L/50) µm L=arbitrary measuring length (mm)	(1.5 + L/50) µm L=arbitrary measuring length (mm)	
Measuring force	Contact point downwards	0.8 N or less		
	Contact point horizontal	0.75 N or less		
	Contact point upwards	0.7 N or less		
Position detection method		Photoelectric linear encode		
Response speed		400 mm/s	1500 mm/s	
Output signal		90° phase difference, differential square wave (RS-422A equivalent), minimum edge intervals: 200 ns for 0.1 µm model, 250 ns for 0.5 µm model, 500 ns for 1 µm model		
Output signal pitch		0.4 µm	2 µm	4 µm
Mass		Approx. 175 g		
Contact point		ø3 mm carbide tipped (fixing screw: M2.5 (P=0.45) x5), standard contact point: **901312**		
Stem		ø8 mm		
Bearing		Linear ball type		
Output cable length		2 m (directly from casing)		
Connector		Plug: RM12BPE-6PH (HIROSE), Compatible receptacle: RM12BRD-6S (HIROSE)		
Operating temperature (humidity) ranges		0 to 40 °C (RH 20 to 80 %, non-condensing)		
Storage temperature (humidity) ranges		–10 to 60 °C (RH 20 to 80 %, non-condensing)		

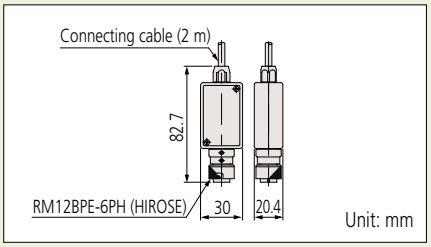
DIMENSIONS

Unit: mm

542-158 / 542-157 / 542-156



Connector



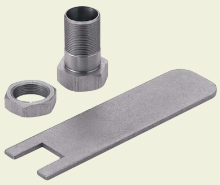
Optional Accessories

- Air lifter: **02ADE230**

Note 1: Required air pressure: 0.2 to 0.4 MPa
(With a 0.1 µm resolution type: 0.2 MPa)
Note 2: Spindle extends when air is supplied.

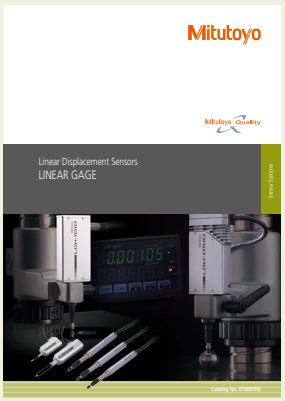
- Rubber boot: **238772** (spare)
- Thrust stem set *: **02ADB680**
  Thrust stem : **02ADB681**
  Clamp nut : **02ADB682**
- Special wrench : **02ADB683**

* Thrust stem set is a combination of thrust stem and a clamp nut. A special wrench is required for tightening. If using multiple gages, a thrust stem set for each gage and one special wrench are required.



- Extension cable
  5 m: **902434**
  10 m: **902433**
  20 m: **902432**

Note 3: Connectable up to 3 pieces, 20 m at maximum.



Refer to the Linear Gage Brochure (**E13007**) for more details.

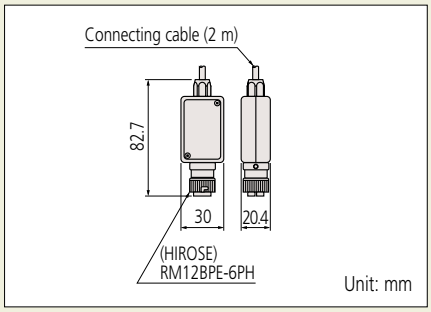
Optional Accessories

- Rubber boot (spare)
  For 5 mm range models : **238773**
  For 10 mm range models: **238772**
- Extension cable
  5 m : **902434**
  10 m: **902433**
  20 m: **902432**

Note: Connectable up to 3 pieces, 20 m at maximum.

- Wrench for tightening nut: **200168**

Connector



LGB2
SERIES 542 — Slim Type

- Slim design, nut clamp type (Stem is ø9.5 mm)
- The spindle used in this series is supported by a linear ball bearing to enhance durability.

G

542-246

542-244

542-262 / 542-262H
542-264

542-270

SPECIFICATIONS

Type		L-shaped		Straight		Low measuring force	Air-driven contact point*1
Order No.		**542-246**	**542-244**	**542-262**	**542-262H**	**542-264**	**542-270***2
Measuring range		5 mm		10 mm			
Resolution		0.1 µm	1 µm				
Measuring accuracy (20 °C)		0.8 µm	2 µm		1 µm	2 µm	
Maximum response speed		380 mm/s	900 mm/s				
Measuring force	Contact point downwards	0.65 N or less		0.8 N or less		0.6 N or less	0.8 N or less
	Contact point horizontal	0.6 N or less		0.75 N or less		0.55 N or less	0.75 N or less
	Contact point upwards	0.55 N or less		0.7 N or less		0.5 N or less	0.7 N or less
Mass		Approx. 160 g		Approx. 155 g			Approx. 170 g
Contact point		ø3 mm carbide tipped (fixing screw: M2.5 (P=0.45) ×5), standard contact point: **901312**					
Stem		ø9.5 mm					
Bearing		Linear ball type					
Output cable length		2 m (directly from casing)					
Connector		Plug: RM12BPE-6PH (HIROSE), Compatible receptacle: RM12BRD-6S (HIROSE)					
Operating temperature (humidity) ranges		0 to 40 °C (RH 20 to 80 %, non-condensing)					
Storage temperature (humidity) ranges		–10 to 60 °C (RH 20 to 80 %, non-condensing)					
Standard Accessories		Wrench for contact point: **538610**					

*1 Required air pressure: 0.3 to 0.4 MPa
*2 Spindle extends when air is supplied.

Example of slim gage head low measuring force (made to order)

- Low measuring force, suitable for measurement of soft-material workpieces (consult us for other measuring forces).

Model		L-shaped model	Air-driven contact point model
Measuring range		5 µm	10 µm
Resolution		1 µm	1 µm
Measuring force*	Contact point downwards	0.5 N or less	0.6 N or less
	Contact point horizontal	0.45 N or less	0.55 N or less
	Contact point upwards	0.4 N or less	0.5 N or less

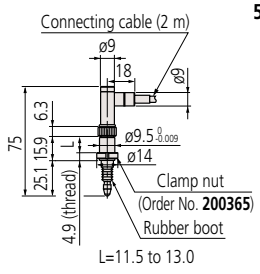
* Measuring force at the maximum retraction depth within the measuring range

Depending on the operating method, the spindle forward speed of the low measuring force model may be slow compared to the standard model. Please check if this restriction is compatible with the application. Please contact Mitutoyo to verify the application.

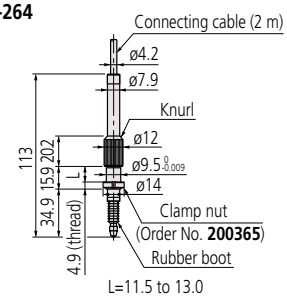
DIMENSIONS

Unit: mm

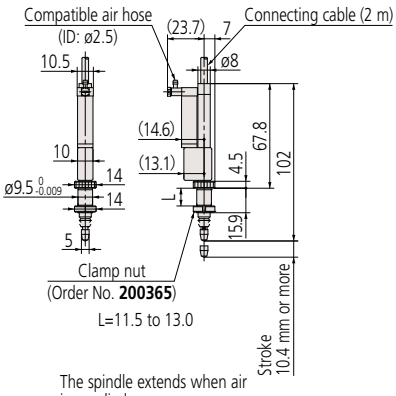
542-246/ 542-244



542-262 / 542-262H
542-264



542-270



Linear Gages

Ideal for integration into harsh environments such as automation applications

LGF
SERIES 542 — Economical Design

- Excellent vibration/shock resistance due to the design of the spindle guide.
- Sliding durability improved to remain serviceable for at least 15 million cycles (in-house testing).
- Shock resistance, 100 G/11 ms (IEC 60068-2-27)
- The **LGF-Z** Series, which is equipped with a reference point mark on the linear encoder (refer to page G-9), and includes a 0.1 µm resolution type (refer to page G-8) is also available.

542-171/542-161

IP66

542-172/542-162

IP66

542-173/542-163

IP66

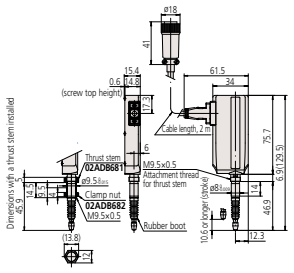
SPECIFICATIONS

Order No.		542-171	542-161	542-172	542-162	542-173	542-163
Measuring range		10 mm		25 mm		50 mm	
Resolution		0.5 µm	1 µm	0.5 µm	1 µm	0.5 µm	1 µm
Measuring accuracy (20 °C)		(1.5 + L/50) µm L=arbitrary measuring length (mm)					
Measuring force	Contact point downwards	1.2 N or less		4.6 N or less		5.7 N or less	
	Contact point horizontal	1.1 N or less		4.3 N or less		5.3 N or less	
	Contact point upwards	1.0 N or less		4.0 N or less		4.9 N or less	
Position detection method		Photoelectric linear encoder					
Response speed		1500 mm/s					
Output		90° phase difference, differential square wave (RS-422A equivalent), minimum edge intervals: 1000 ns for 5 µm model, 500 ns for 1 µm model, 250 ns for 0.5 µm model					
Output square wave pitch		2 µm	4 µm	2 µm	4 µm	2 µm	4 µm
Mass		Approx. 260 g		Approx. 300 g		Approx. 400 g	
Contact point		ø3 mm carbide tipped (fixing screw: M2.5 (P=0.45) ×5), standard contact point: **901312**					
Stem		ø8 mm		ø15 mm			
Bearing		Linear ball type					
Output cable length		2 m (directly from casing)					
Connector		Plug: RM12BPE-6PH (HIROSE), Compatible receptacle: RM12BRD-6S (HIROSE)					
Operating temperature (humidity) ranges		0 to 40 °C (RH 20 to 80 %, non-condensing)					
Storage temperature (humidity) ranges		–10 to 60 °C (RH 20 to 80 %, non-condensing)					

DIMENSIONS

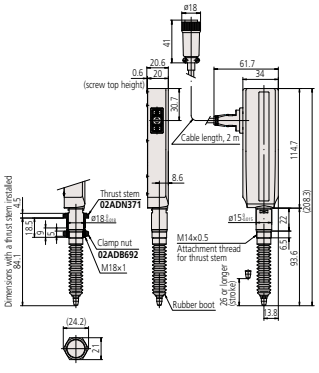
Unit: mm

542-171/542-161



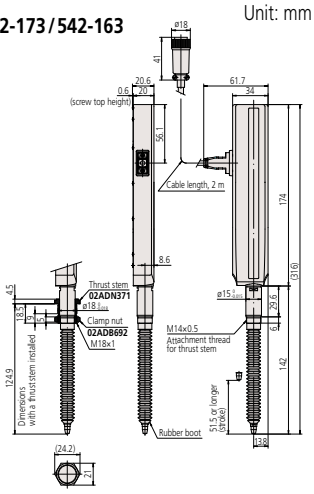
With thrust stem set (optional accessory)

542-172/542-162



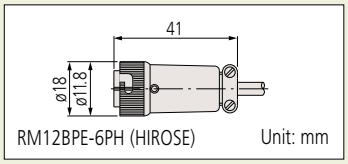
With thrust stem set (optional accessory)

542-173/542-163



With thrust stem set (optional accessory)

Connector



RM12BPE-6PH (HIROSE) Unit: mm

Optional Accessories

- Air drive unit
  For 10 mm range models: **02ADE230**
  For 25 mm range models: **02ADE250**
  For 50 mm range models: **02ADE270**

Note 1: Required air pressure: 0.2 to 0.4 MPa
Note 2: Spindle extends when air is supplied.

Equipped with the **LGK**

- Rubber boot (spare)
  For 10 mm range models: **238772**
  For 25 mm range models: **962504**
  For 50 mm range models: **962505**
- Thrust stem set *
  For 10 mm range models: **02ADB680**
  Thrust stem: **02ADB681**
  Clamp nut: **02ADB682**
  For 25/50 mm range models: **02ADN370**
  Thrust stem: **02ADN371**
  Clamp nut: **02ADB692**
  Note 3: External dimensions are described in the dimensional drawing of the product.
- Special wrench
  For 10 mm range models: **02ADB683**
  For 25/50 mm range models: **02ADB693**

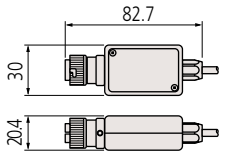
* Thrust stem set is a combination of thrust stem and a clamp nut. A special wrench is required for tightening. If using multiple gages, a thrust stem set for each gage and one special wrench are required.

- Extension cable
  5 m : **902434**
  10 m: **902433**
  20 m: **902432**

Note 4: Connectable up to 3 pieces, 20 m at maximum.

Refer to the Linear Gage Brochure (**E13007**) for more details.

Connector



RM12BPE-6PH (HIROSE) Unit: mm

Optional Accessories

- Air drive unit
  For 10 mm range models: **02ADE230**
  For 25 mm range models: **02ADE250**

Note 1: Required air pressure: 0.2 to 0.4 MPa
(With a 0.1 µm resolution type: 0.2 MPa)

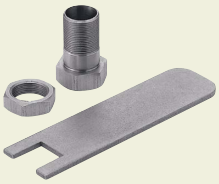
Note 2: Spindle extends when air is supplied.

- Rubber boot (spare)
  For 10 mm range models: **238772**
  For 25 mm range models: **962504**
- Thrust stem set*
  For 10 mm range models: **02ADB680**
  Thrust stem: **02ADB681**
  Clamp nut: **02ADB682**
  For 25 mm range models: **02ADN370**
  Thrust stem: **02ADN371**
  Clamp nut: **02ADB692**

Note 3: External dimensions are described in the dimensional drawing of the product.

- Special wrench
  For 10 mm range models: **02ADB683**
  For 25 mm range models: **02ADB693**

* Thrust stem set is a combination of thrust stem and a clamp nut. A special wrench is required for tightening. If using multiple gages, a thrust stem set for each gage and one special wrench are required.



- Extension cable
  5 m : **902434**
  10 m: **902433**
  20 m: **902432**

Note 4: Connectable up to 3 pieces, 20 m at maximum.

Refer to the Linear Gage Brochure (**E13007**) for more details.

LGF (0.1 µm resolution)
SERIES 542 — Economical Design

- 0.1 µm resolution type from the reliable **LGF** Series.

542-181

542-182

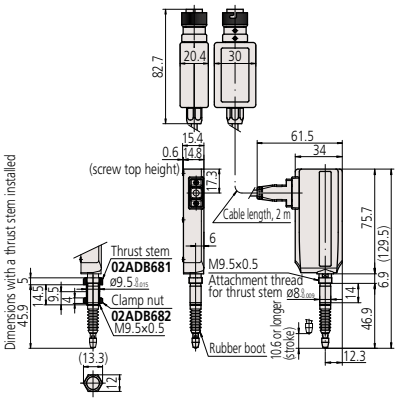
SPECIFICATIONS

Order No.		542-181	542-182
Measuring range		10 mm	25 mm
Resolution		0.1 µm	
Measuring accuracy (20 °C)		(0.8 + L/50) µm L=arbitrary measuring length (mm)	
Measuring force	Contact point downwards	1.2 N or less	4.6 N or less
	Contact point horizontal	1.1 N or less	4.3 N or less
	Contact point upwards	1.0 N or less	4.0 N or less
Position detection method		Photoelectric linear encoder	
Response speed		400 mm/s	
Output signal		90° phase difference, differential squarewave (RS-422A equivalent) Minimum edge-to-edge interval, 200 ns	
Output signal pitch		0.4 µm	
Mass		Approx. 310 g	Approx. 350 g
Contact point		ø3 mm carbide tipped (fixing screw: M2.5 (P=0.45) ×5), standard contact point: **901312**	
Stem		ø8 mm	ø15 mm
Bearing		Linear ball type	
Output cable length		2 m (directly extended from the main unit)	
Connector		Plug: RM12BPE-6PH (HIROSE), Compatible receptacle: RM12BRD-6S (HIROSE)	
Operating temperature (humidity) ranges		0 to 40 °C (RH 20 to 80 %, non-condensing)	
Storage temperature (humidity) ranges		–10 to 60 °C (RH 20 to 80 %, non-condensing)	

DIMENSIONS

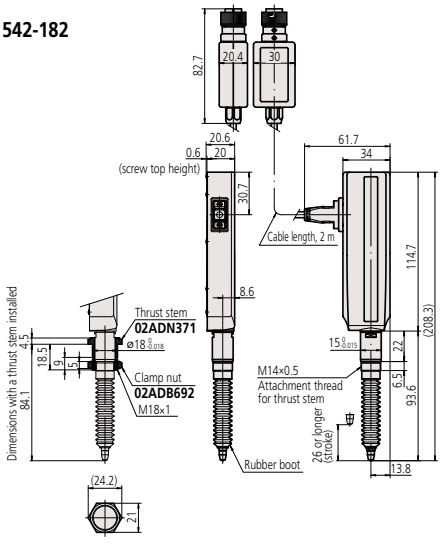
Unit: mm

542-181



With thrust stem set (optional accessory)

542-182



With thrust stem set (optional accessory)

Mitutoyo

Linear Gages

Ideal for integration into harsh environments such as automation applications

LGF-Z
SERIES 542 — with Origin Point Mark

- **LGF** Series with reference point signal output function.
- The master setting is incorporated in the unit and is easy to operate. The origin point can be easily detected even if a fault, such as an over-speed error, occurs.
- Sliding durability improved to remain serviceable for at least 15 million cycles (in-house testing).
- Shock resistance, 100 G/11 ms (IEC 60068-2-27)
- Resolutions are available in 0.5 µm and 1 µm.

542-174 / 542-164

542-175 / 542-165

542-176 / 542-166

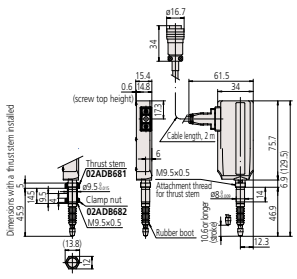
SPECIFICATIONS

Order No.		542-174	542-164	542-175	542-165	542-176	542-166
Measuring range		10 mm		25 mm		50 mm	
Resolution		0.5 µm	1 µm	0.5 µm	1 µm	0.5 µm	1 µm
Measuring accuracy (20 °C)		(1.5 + L/50) µm L=arbitrary measuring length (mm)					
Measuring force	Contact point downwards	1.2 N or less		4.6 N or less		5.7 N or less	
	Contact point horizontal	1.1 N or less		4.3 N or less		5.3 N or less	
	Contact point upwards	1.0 N or less		4.0 N or less		4.9 N or less	
Position detection method		Photoelectric linear encoder					
Reference mark position		Approx. 3 mm from contact point tip (lowest rest point)		Approx. 5 mm from contact point tip (lowest rest point)			
Reference mark repeatability (20 °C): σ		σ≤0.5 µm (at a constant reference point passing speed less than 300 mm/s in the same direction)					
Response speed		1500 mm/s					
Output signal		90° phase difference, differential square wave (RS-422A equivalent), minimum edge intervals: 250 ns for 0.5 µm model, 500 ns for 1 µm model					
Output square wave pitch		2 µm	4 µm	2 µm	4 µm	2 µm	4 µm
Mass		Approx. 260 g		Approx. 300 g		Approx. 400 g	
Contact point		ø3 mm carbide tipped (fixing screw: M2.5 (P=0.45) ×5), standard contact point: **901312**					
Stem		ø8 mm		ø15 mm			
Bearing		Linear ball type					
Output cable length		2 m (directly extended from the main unit)					
Connector		Plug: EPRC05-P8M (TAJIMI), Compatible receptacle: EPRC05-R8F (TAJIMI)					
Operating temperature (humidity) ranges		0 to 40 °C (RH 20 to 80 %, non-condensing)					
Storage temperature (humidity) ranges		–10 to 60 °C (RH 20 to 80 %, non-condensing)					

DIMENSIONS

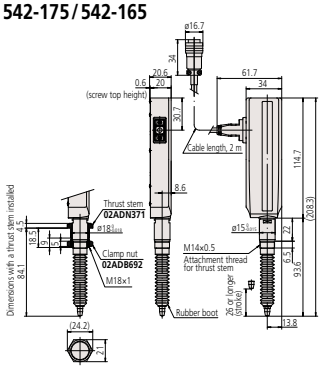
Unit: mm

542-174 / 542-164



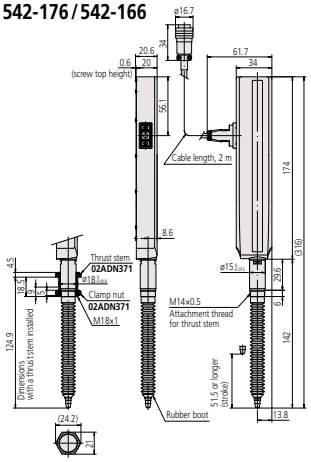
With thrust stem set (optional accessory)

542-175 / 542-165



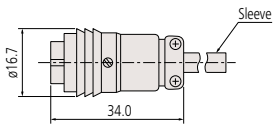
With thrust stem set (optional accessory)

542-176 / 542-166



With thrust stem set (optional accessory)

Connector



EPCR05-EP8M (TAJIMI) Unit: mm

Optional Accessories

- Air drive unit
  For 10 mm range models: **02ADE230**
  For 25 mm range models: **02ADE250**
  For 50 mm range models: **02ADE270**

Note 1: Required air pressure: 0.2 to 0.4 MPa
Note 2: Spindle extends when air is supplied.

Equipped with the **LGK**

- Rubber boot (spare)
  For 10 mm range models: **238772**
  For 25 mm range models: **962504**
  For 50 mm range models: **962505**
- Thrust stem set *
  For 10 mm range models: **02ADB680**
  Thrust stem: **02ADB681**
  Clamp nut: **02ADB682**
  For 25/50 mm range models: **02ADN370**
  Thrust stem: **02ADN371**
  Clamp nut: **02ADB692**

Note 3: External dimensions are given in the drawing of the product.

- Special wrench
  For 10 mm range models: **02ADB683**
  For 25/50 mm range models: **02ADB693**

* Thrust stem set is a combination of thrust stem and a clamp nut. A special wrench is required for tightening. If using multiple gages, a thrust stem set for each gage and one special wrench are required.

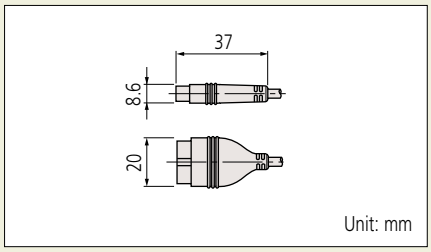
- Extension cable
  5 m : **02ADF260**
  10 m: **02ADF280**
  20 m: **02ADF300**

Note 4: Connectable up to 3 pieces, 20 m at maximum.

Refer to the Linear Gage Brochure (**E13007**) for more details.

ABSOLUTE™

Connector



Unit: mm

Optional Accessories

- Rubber boot: **238774** (spare)
- Air drive unit (metric): **903594**
- Air drive unit (inch): **903598**
- SPC cable extension adapter: **02ADF640**
- Extension cable for Digimatic gages (0.5 m): **02ADD950**
- Extension cable for Digimatic gages (1 m): **936937**
- Extension cable for Digimatic gages (2 m): **965014**

Note: When connecting an extension cable, an SPC cable extension adapter is required.

Refer to the Linear Gage Brochure (**E13007**) for more details.

LGS-1012P
SERIES 575 — 0.01 mm Resolution Type

- ABSOLUTE electrostatic capacitance type encoder makes it possible to maintain the reference point even when the power is switched off.
- Excellent protection against dust and splashing water (IP66) on the factory floor.

575-303

IP66

G

SPECIFICATIONS

Metric

Order No.		**575-303**
Measuring range		12.7 mm
Resolution		10 µm
Measuring accuracy (20 °C)		15 µm
Measuring force	Contact point downwards	2 N or less
	Contact point horizontal	1.8 N or less
	Contact point upwards	1.6 N or less
Position detection method		ABSOLUTE electrostatic capacitance type linear encoder
Response speed		Unlimited (not applicable to scanning measurement)
Output		Digimatic code
Mass		Approx. 190 g
Contact point		ø3 mm carbide tipped (fixing screw: M2.5 (P=0.45) ×5), standard contact point: **901312**
Stem		ø8 mm
Bearing		Plain type
Output cable length		2 m (directly extended from the main unit)
Operating temperature (humidity) ranges		0 to 40 °C (RH 20 to 80 %, non-condensing)
Storage temperature (humidity) ranges		–10 to 60 °C (RH 20 to 80 %, non-condensing)

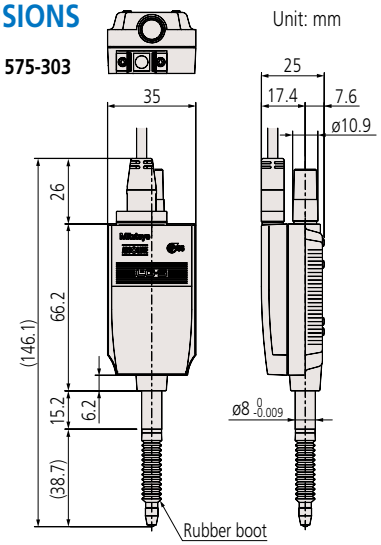
Inch

Order No.		**575-313**
Measuring range		0.5 in
Resolution		0.0005 in
Measuring accuracy (20 °C)		0.0008 in
Measuring force	Contact point downwards	2 N or less
	Contact point horizontal	1.8 N or less
	Contact point upwards	1.6 N or less
Position detection method		ABSOLUTE electrostatic capacitance type linear encoder
Response speed		Unlimited (not applicable to scanning measurement)
Output		Digimatic code
Mass		Approx. 190 g
Contact point		ø3 mm carbide tipped (fixing screw: 4-48 UNF), standard contact point: **21BZB005**
Stem		ø9.52=3/8 in DIA
Bearing		Plain type
Output cable length		2 m (directly extended from the main unit)
Operating temperature (humidity) ranges		0 to 40 °C (RH 20 to 80 %, non-condensing)
Storage temperature (humidity) ranges		–10 to 60 °C (RH 20 to 80 %, non-condensing)

DIMENSIONS

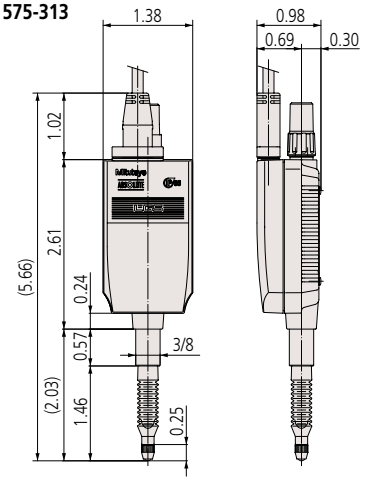
Unit: mm

575-303



Unit: in

575-313



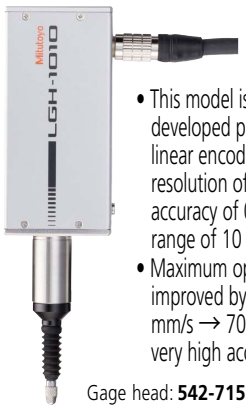
Linear Gages

Ideal for integration into harsh environments such as automation applications

LGH (0.01/0.005 µm resolution)
SERIES 542 — High-accuracy/resolution Type

G

- This series has achieved very high accuracy combined with a resolution of 0.01/0.005 µm (according to model), practically equivalent to that of a laser interferometer, and a wide measuring range of 10 mm.
- A compact body design makes a significant contribution to a downsizing of this gage itself, which is best suited for calibration/evaluation of master gages as well as measurement of high-precision parts and as a length measuring sensor incorporated into high-precision positioning/control units.
- A low measuring force model is available for those applications where measurement of easily deformed or damaged workpieces is required.
- Every **LGH** Series gage is bundled with a dedicated counter.



- This model is equipped with a newly developed photoelectric reflection-type linear encoder, achieving an excellent resolution of 0.01 µm, a measuring accuracy of 0.2 µm and a measuring range of 10 mm at a low price.
- Maximum operating speed has been improved by a factor of 2.8 times (250 mm/s → 700 mm/s) while maintaining very high accuracy.

Gage head: **542-715**

- This model is equipped with a newly developed ultra-high precision transmission type linear encoder, achieving the outstanding resolution of 0.005 µm (5 nm).
- Exceptional measuring accuracy of 0.1 µm has been attained over the wide measuring range of 10 mm. This series is most suited for calibration/evaluation of master gages where its wide measuring range is a great advantage.

Gage head: **542-720**

Dedicated counter

TYPICAL APPLICATIONS

Master gage calibration/evaluation

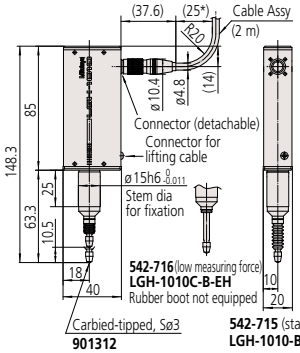
Inspection of high-precision parts

Needle contact-point mounting example

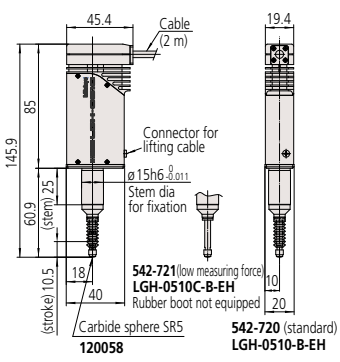
DIMENSIONS

Unit: mm

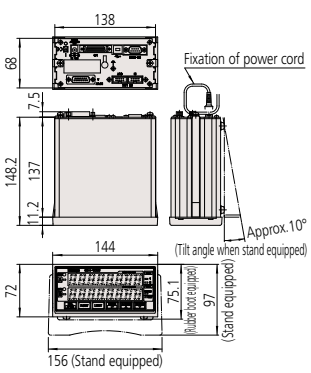
542-716



542-721



Dedicated counter (set)

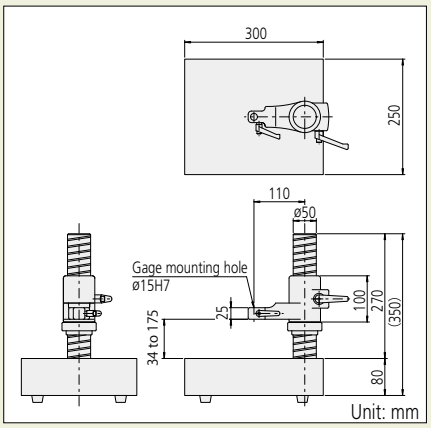


* Minimum bending radius or minimum dressed dimension

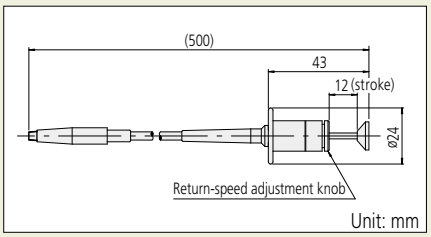
An inspection certificate is supplied as standard.
Refer to page U-11 for details.

Optional Accessories

- Measuring stand: **971750**

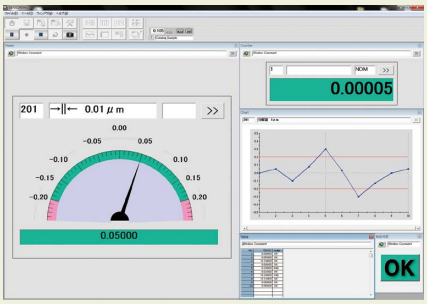


- Spindle lifting cable: **971753**



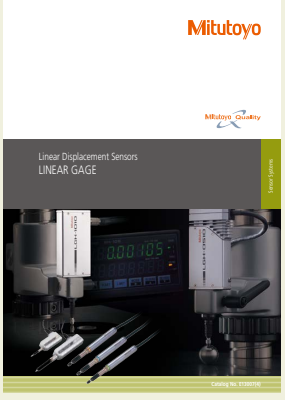
- I/O connector: **02ADB440**

- **SENSORPAK**



Note: Refer to page G-18 for more details.

- Rubber boot: **238772**
  (Spare for **542-715** and **542-720**)



Refer to the Linear Gage Brochure (**E13007**) for more details.

SPECIFICATIONS

Order No.		Resolution 0.01 µm / Accuracy 0.2 µm model	
		542-715 (Standard)	**542-716** (Low measuring force)
Measuring range		10 mm	
Resolution		0.01 µm (0.05 µm, 0.1 µm, 0.5 µm, 1 µm can be selected from the counter)	
Measuring accuracy (20 °C)*1		0.2 µm	
Repeatability (20 °C)*1		0.1 µm (2σ)	
Retrace error (20 °C)*1		0.1 µm	
Measuring force	Contact point downwards	0.65 N or less	Approx. 0.12 N
	Contact point horizontal	0.55 N or less	Not applicable
	Contact point upwards	0.45 N or less	Not applicable
Position detection method		Photoelectric reflection type linear encoder	
Detectable operation speed		In normal measurement: 700 mm/sec; for peak detection: 120 mm/sec	
Mass of gage head		Approx. 370 g	
Contact point		Carbide tipped, Sø3 mm (M2.5 (P=0.45) ×5 mm), standard contact point: **901312**	
Stem		ø15 mm	
Bearing		Linear ball type	
Output cable length		Approx. 2 m	
Operating temperature (humidity) ranges		0 to 40 °C (Reference temperature 20 °C)/20 to 80 % RH (non-condensing)	
Storage temperature (humidity) ranges		–10 to 60 °C/20 to 80 % RH (non-condensing)	
Counter Specifications			
Display range		±999.99999 mm	
Functions		Zero-setting, presetting, direction changeover, tolerance judgment (3 steps/5 steps), RS-RINK	
Peak hold function		Yes	
Interface		RS-232C, USB (only for **SENSORPAK**), Digimatic (Printer: **DP-1VA LOGGER**)*3, I/O Connector	
External output		• RS-232C: counting data • Digimatic output: counting data*3 • I/O connector: counting data (simplified BCD), tolerance judgment result, simplified analog output	
External control		Zero-setting, presetting, data hold, peak measurement mode selection, peak clear	
Power supply		Suppplied AC Adapter, or 12 to 24 V DC, max. 700 mA	
Power consumption		8.4 W (max. 700 mA), ensure at least 1 A power supply per unit.	
Mass of counter		Approx. 900 g (AC Adapter excluded)	
Standard accessories		Wrench for contact point, rubber boot, stand, washer (for counter), AC Adapter, AC cord, DC plug, user's manual, inspection certificate	

Order No.		Resolution 0.005 µm / Accuracy 0.1 µm model	
		542-720 (Standard)	**542-721** (Low measuring force)
Measuring range		10 mm	
Resolution		0.005 µm (0.01 µm, 0.05 µm, 0.1 µm can be selected from the counter)	
Measuring accuracy (20 °C)*1		0.1 µm	
Repeatability (20 °C)*1		0.02 µm (2σ)	
Retrace error (20 °C)*1		0.05 µm	
Measuring force	Contact point downwards	0.65 N or less	Approx. 0.1 N
	Contact point horizontal	0.55 N or less	Not applicable
	Contact point upwards	0.45 N or less	Not applicable
Position detection method		Ultra-high accuracy transmission type linear encoder	
Detectable operation speed		In normal measurement: 250 mm/sec	
Mass of gage head		Approx. 370 g	
Contact point		Carbide sphere SR5 (M2.5 (P=0.45) ×5 mm), standard contact point: **120058**	
Stem		ø15 mm	
Bearing		Linear ball type	
Output cable length		Approx. 2 m	
Operating temperature (humidity) ranges		15 to 25 °C (Reference temperature 20 °C)/30 to 60 % RH (non-condensing)	
Storage temperature (humidity) ranges		–10 to 60 °C/20 to 80 % (non-condensing)*2	
Counter Specifications			
Display range		±99.999995 mm	
Functions		Zero-setting, presetting, direction changeover, tolerance judgment (3 steps/5 steps), RS-RINK	
Peak hold function		No	
Interface		RS-232C, USB (only for **SENSORPAK**), Digimatic (Printer: **DP-1VA LOGGER**)*3, I/O Connector	
External output		• RS-232C: counting data • Digimatic output: counting data*3 • I/O connector: counting data (simplified BCD), tolerance judgment result, simplified analog output	
External control		Zero-setting, presetting, data hold	
Power supply		Suppplied AC Adapter, or +12 to 24 V DC, max. 700 mA	
Power consumption		8.4 W (max. 700 mA), ensure at least 1 A power supply per unit.	
Mass of counter		Approx. 900 g (AC Adapter excluded)	
Standard accessories		Wrench for contact point, rubber boot, stand, washer (for counter), AC Adapter, AC cord, DC plug, user's manual, inspection certificate	

*1 Applies when used with counter.
*2 The storage temperature/humidity ranges after unpacking are the same as the operating temperature/humidity ranges.
*3 Digimatic output shall be up to 6 digits of data. For data of 7 digits or more, all digits will not be output to the display.

Refer to the Linear Gage Brochure (**E13007**) for more details.

Linear Gages

Ideal for integration into harsh environments such as automation applications

EC Counter
SERIES 542 — Only for Digimatic output

- This Digimatic display can be connected to Linear gages with Digimatic output (**LGS**).
- Employs DIN size (96×48 mm) and mount-on-panel configuration to facilitate system integration.
- It has a data output and tolerance evaluation function.

542-007

SPECIFICATIONS

Order No.		**542-007***
Quantizing error		±1 count
Resolution ( ) indicates maximum display range		0.01 mm (±9999.99)/0.0005 in (±99.9995 in)/0.001 in (±999.999 in) 0.001 mm (±999.999)/0.00005 in (±9.99995 in)/0.0001 in (±99.999 in) [Automatic setting by gage]
Display		Sign plus 6 digits (Green LED)
Tolerance judgment display		LED display (3 steps: Amber, Green, Red)
External output (switching type)	Tolerance judgment output	–NG, OK, +NG (open-collector)
	Data output	Digimatic output
Control input		External PRESET, external HOLD
Power supply	Voltage	Supplied AC adapter, or 9 to 12 V DC
	Consumption	4.8 W (max. 400 mA) Ensure at least 1 A is available per unit.
Operating temperature (humidity) ranges		0 to 40 °C (RH 20 to 80 %, non-condensing)
External dimensions		96 (W) ×48 (H) ×84.6 (D) mm
Standard Accessories		AC adapter: (Japan/North America) **06AGC585JA** / (EU) **06AGC585D** / (UK) **06AGC585E** / (Korea) **06AGC585K** / (China) **06AEG302DC**
Applicable gage head		**LGS**, **ID**
Mass		220 g

* To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, D for CEE, DC for CCC, E for BS, K for KC, C and No suffix are required for PSE.

Function

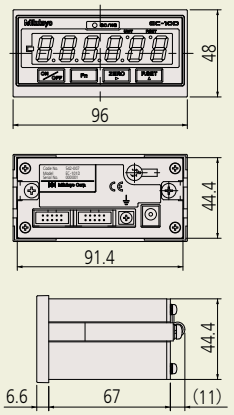
- Preset
- Tolerance judgment (3 steps)
- Digimatic output

Optional Accessories

- Connecting cable for digimatic mini-processor: **936937** (1 m), **965014** (2 m)
- DC plug: **214938**
- I/O cable (2 m): **21HZA222**

DIMENSIONS

Unit: mm



EG Counter
SERIES 542 — Panel mount, Single function Type

- Produces 3-step/5-step, 3 kinds of tolerance output and BCD output.
- A smoothing function reduces display digit fluctuations (**542-015** and **542-017**)
- Employs DIN size (96×48 mm) and mount-on-panel configuration to facilitate system integration.

542-015

542-017

542-016

SPECIFICATIONS

Order No.		**542-015**	**542-017**	**542-016**
Quantizing error		±1 count		
Maximum input frequency		1.25 MHz, response speed depends on gage specification.		—
Resolution ( ) indicates maximum display range		0.01 mm (±9999.99 mm)/0.0005 in (±99.9995 in)/0.001 in (±999.999 in) 0.005 mm (±999.995 mm)/0.00005 in (±9.99995 in)/0.0001 in (±99.999 in) 0.001 mm (±999.999 mm)/0.00005 in (±9.99995 in)/0.0001 in(±99.999 in) 0.0005 mm (±99.9995 mm)/0.000005 in (±0.999995 in)/0.00001 in (±9.99999 in) 0.0001 mm (±99.9999 mm)/0.000005 in (±0.999995 in)/0.00001 in (±9.99999 in)		0.01 mm (±9999.99 mm)/0.0005 in (±99.9995 in)/0.001 in (±999.999 in) 0.001 mm (±999.999 mm)/0.00005 in (±9.99995 in)/0.0001 in (±99.999 in) [Automatic setting by gage]
Tolerance judgment display		LED display (3 steps: Amber, Green, Red/5 steps: Amber, Amber flashing, Green, Red flashing, Red)		
Tolerance judgment output		L1 to L5 (Open-collector/Switchover between L1 to L5 and BCD output with parameter)		
Control output		Open-collector		
BCD output		Open-collector/Switchover between 6-digit (positive/negative-true logic) and tolerance judgment output with parameter		
Control input		Presetting, display hold, peak value clear, tolerance judgment BANK switch		
Power supply	Voltage	12 to 24 V DC, terminal block (M3 screw)		
	Consumption	6 W or less (500 mA max.) Ensure at least 1 A is available per unit.		
Operating temperature (humidity) ranges		0 to 40 °C (RH 20 to 80 %, non-condensing)		
Storage temperature (humidity) ranges		–10 to 50 °C (RH 20 to 80 %, non-condensing)		
External dimensions		96 (W) ×48 (H) ×156 (D) mm		
Applicable gage head		**LGF**, **LGK**, **LGB**, **LGB2*** Model with reference point mark is excluded.	**LGF** with reference point mark	**LGS**, **ID**
Mass		Approx. 400 g		

* When a gage of 0.1 µm resolution is connected, the maximum display range will be ±99.9999.

Function

- Preset
- Direction switch
- Tolerance judgment (3/5-step, 3 kinds)
- Peak (max., min., runout) measurement
- Constant number
- Smoothing
- Error display/output
- Key protection

Optional Accessories

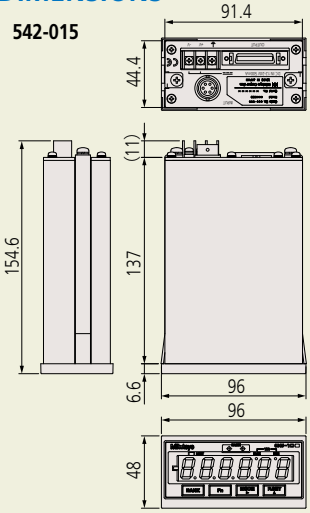
- I/O output connector (with cover): **02ADB440**
- AC adapter: **357651**
- AC cable (Japan): **02ZAA000***
- AC cable (USA): **02ZAA010***
- AC cable (EU): **02ZAA020***
- AC cable (UK): **02ZAA030***
- AC cable (China): **02ZAA040***
- AC cable (Korea): **02ZAA050***
- Terminal connecting cable: **02ADD930***

* Required when using AC adapter.

DIMENSIONS

Unit: mm

542-015



Function

- Preset
- Tolerance judgment output (3/5-step, 7 kinds)
- Limit value output (2 kinds independently for each of the 7 channels)
- Peak (max., min., runout) measurement
- Diverse data output
  (Serial BCD, Simplified analog, Digimatic)

Optional Accessories

- I/O output connector (with cover): **02ADB440**
- AC adapter: **357651**
- AC cable (Japan): **02ZAA000***
- AC cable (USA): **02ZAA010***
- AC cable (EU): **02ZAA020***
- AC cable (UK): **02ZAA030***
- AC cable (China): **02ZAA040***
- AC cable (Korea): **02ZAA050***
- Terminal connecting cable: **02ADD930***
- External switch box
  The tolerance values or preset values can be easily input.
  02ADF180 (with 2 m cable)

* Required when using AC adapter.

Refer to the Linear Gage Brochure (**E13007**) for more details.

EB Counter
SERIES 542 — Panel mount, Multi-function Type

- Produces 3-step/5-step, 7 kinds of tolerance output and limit value output independently for each of 7 channels.
- Comes with serial BCD output capability, for connection to a programmable controller or personal computer, etc.
- Dynamic measurement possible with simplified analog output.
- Employs DIN size (96×48 mm) and mount-on-panel configuration to facilitate system integration.

542-092-2

542-094-2

542-093-2

SPECIFICATIONS

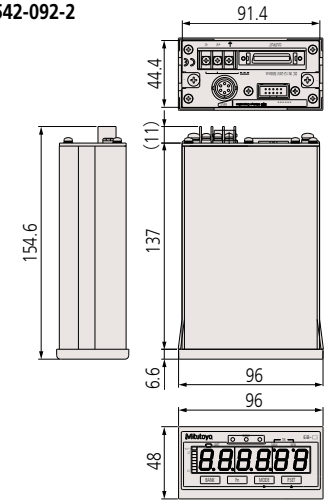
Order No.		542-092-2	542-094-2	542-093-2
Quantizing error		±1 count		
Maximum input frequency		1.25 MHz (2-phase square wave), response speed depends on gage specification.		Response speed depends on gage specification.
Resolution ( ) indicates maximum display range		0.01 mm (±9999.99 mm)/0.0005 in (±99.9995 in) 0.005 mm (±999.995 mm)/0.00005 in (±9.99995 in) 0.001 mm (±999.999 mm)/0.00005 in (±9.99995 in) 0.0005 mm (±99.9995 mm)/0.000005 in (±0.999995 in) 0.0001 mm (±99.9999 mm)/0.000005 in (±0.999995 in) [Parameter set]		0.01 mm (±9999.99 mm)/0.0005 in (±99.9995 in) 0.001 mm (±999.999 mm)/0.00005 in (±9.99995 in) [Automatic setting by gage]
Tolerance judgment display		LED display (3 steps: Amber, Green, Red/5 steps: Amber, Amber flashing, Green, Red flashing, Red)		
Input/output	Tolerance judgment output	L1 to L5, open-collector		
	Control output	Open-collector		
	Control input	Presetting, display hold, peak value clear, tolerance judgment BANK switch, open-collector or no-voltage contact signal (with/without contact point)		
Interface	Serial BCD	Bit serial format, open-collector		
	Analog output	2.5 V + Counting value×Voltage resolution (25 mV/2.5 mV): Full-scale 0 to 5 V		
	Digimatic input/output	• Connecting to the external switch box (**02ADF180**) makes it easy to enter tolerance limits and preset values. Note: This function is not available when the gage is connected to Digimatic Mini-Processor **DP-1VA LOGGER** (**264-505**). • It can be connected to **DP-1VA LOGGER** (**264-505**) and to **IT-016U**.		
Power supply	Voltage	12 to 24 V DC, terminal block (M3 screw)		
	Consumption	6 W or less (500 mA max.) Ensure at least 1 A is available per unit.		
Operating temperature (humidity) ranges		0 to 40 °C (RH 20 to 80 %, non-condensing)		
Storage temperature (humidity) ranges		–10 to 50 °C (RH 20 to 80 %, non-condensing)		
Applicable gage head		**LGF**, **LGK**, **LGB**, **LGB2*** Models with reference point mark is excluded.	**LGF** with reference point mark	**LGS**, **ID**
Mass		Approx. 400 g	Approx. 400 g	Approx. 400 g

* When a gage of 0.1 µm resolution is connected, the maximum display range will be ±99.9999.

DIMENSIONS

Unit: mm

542-092-2



Linear Gages

Ideal for integration into harsh environments such as automation applications

EH Counter
SERIES 542 — Panel mount, Multi-function Type with RS-232C Communication Functions

- Two types are available for this model: a 1-axis display and a 2-axis display, both of which enable addition or subtraction calculations between two gages.
- Multifunctional counter equipped with zero-setting, presetting, tolerance judgment.
- RS-232C and USB are equipped as standard. Data transfer to a PC is possible. (USB is supported only by Mitutoyo **SENSORPAK**.)
- A multi-point measuring system (max. 20 points and max. 10 units) can easily be configured with the built-in RS Link networking function. Refer to "Quick Guide to Precision Measuring Instruments" on page G-21 for details of the RS link.
- Employs DIN size (144×72 mm) and mount-on-panel configuration to facilitate system integration.

542-075

542-071

542-073

542-072

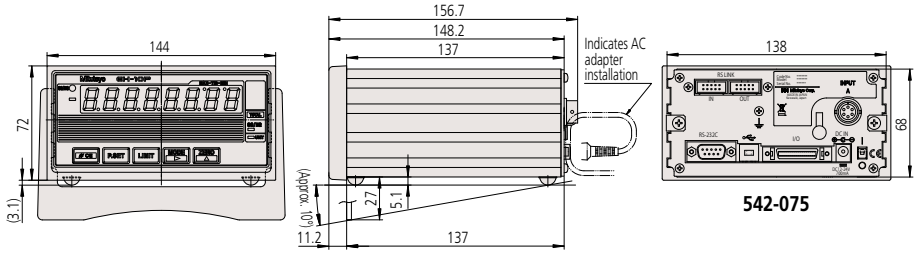
SPECIFICATIONS

Order No.		542-075*	542-071*	542-073*	542-072*
Number of axes to be displayed		1 axis	2 axes		
Quantizing error		±1 count			
Maximum input frequency		2.5 MHz (2-phase square wave)			—
Resolution ( ) indicates maximum display range		0.01 mm (±9999.99 mm)/0.0005 in (±99.9995 in) 0.005 mm (±999.995 mm)/0.00005 in (±9.99995 in) 0.001 mm (±999.999 mm)/0.00005 in (±9.99995 in) 0.0005 mm (±99.9995 mm)/0.000005 in (±0.999995 in) 0.0001 mm (±99.9999 mm)/0.000005 in (±0.999995 in) [Parameter set]			Automatic setting by gage
Tolerance judgment display		LED display (3 steps: Amber, Green, Red/5 steps: Amber, Amber flashing, Green, Red flashing, Red)			
Interface		RS-232C/USB/parameter selection via digimatic (only **DP-1VA LOGGER**, digimatic mini-processor can be connected) (USB used only with **SENSORPAK**.) Selection by parameter from 3-step, 5-step, or simple BCD Total tolerance judgment output (when tolerance function is enabled) Analog output (1 V to 4 V)			
Input/output	Control output	Open-collector			
	Control input	Display BANK switching, peak mode, presetting, display hold, hold per axis: open-collector or no-voltage contact signal (with/without contact point)			
Power supply	Voltage	Supplied AC adapter, or 12 to 24 V DC			
	Consumption	8.4 W (max. 700 mA) Ensure at least 1 A is available per unit.			
Operating temperature (humidity) ranges		0 to 40 °C (RH 20 to 80 %, non-condensing)			
Storage temperature (humidity) ranges		–10 to 50 °C (RH 20 to 80 %, non-condensing)			
AC adapter/AC cable		AC adapter: **357651**/ AC cable: **02ZAA000**, AC cable (Japan): **02ZAA000***, AC cable (USA): **02ZAA010***, AC cable (EU): **02ZAA020***, AC cable (UK): **02ZAA030***, AC cable (China): **02ZAA040***, AC cable (Korea): **02ZAA050***			
Applicable gage head		**LGF**, **LGK**, **LGB**, **LGB2** Model with reference point mark is excluded.		**LGF** with reference point mark	**LGS**, **ID**
Mass		Approx. 760 g	Approx. 800 g	Approx. 800 g	Approx. 800 g

* To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, D for CEE, DC for CCC, E for BS, K for KC, C and No suffix are required for PSE.
For those models of the Order No. with Suffix "1", an AC adapter is not supplied as a standard accessory.

DIMENSIONS

Unit: mm

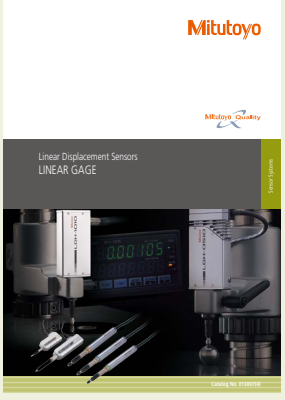


542-075

Optional Accessories

- I/O output connector (with cover): **02ADB440**
- SPC cable (0.5 m): **02ADD950**
- SPC cable (1 m): **936937**
- SPC cable (2 m): **965014**
- Measurement data loading software: **SENSORPAK**

Note: The Digimatic connecting cable doubles as a RS Link cable.



Refer to the Linear Gage Brochure (**E13007**) for more details.

Function

- External Control (Zero-set, Preset etc.)
- Direction switch
- Error display
- Tolerance judgment output
- Diverse data output
  (RS-232C, BCD, Segment)
- Peak measurement
  Maximum value, minimum value, runout, and differential measurement between two gages
  Addition, averaging, maximum value, minimum value, and maximum width

Optional Accessories

- Output connector: **02ADB440**
- D-EV External display unit*1: **02ADD400**
- SPC cable (0.5 m): **02ADD950**
- SPC cable (1 m): **936937**
- SPC cable (2 m): **965014**
- AC adapter: **357651**
- AC cable (Japan): **02ZAA000***2
- AC cable (USA): **02ZAA010***2
- AC cable (EU): **02ZAA020***2
- AC cable (UK): **02ZAA030***2
- AC cable (China): **02ZAA040***2
- AC cable (Korea): **02ZAA050***2
- Terminal connecting cable: **02ADD930***2

*1 Refer to page G-17 for details of **D-EV**.
*2 Required when using AC adapter.

SENSORPAK

Note: Refer to page G-18 for more details.

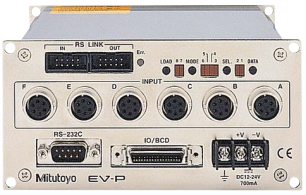
Refer to the Linear Gage Brochure (**E13007**) for more details.

EV-16P/Z/D Counter
SERIES 542 — 6-channel, No-display Type

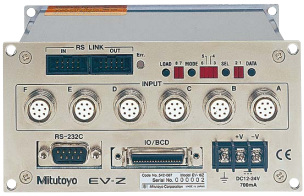
- Up to six gages can be connected to one unit, extendable up to 10 units (60 gages at maximum) using the RS Link function* to facilitate the configuration of a multi-point measurement system.

* Refer to "Quick Guide to Precision Measuring Instruments" on page G-21 for details of the RS link.

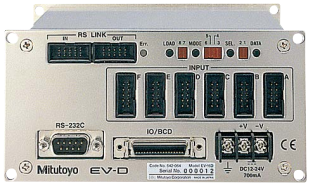
- A range of output modes to choose from: I/O output for tolerance judgment and segment output, BCD data output and RS-232C output are available.
- Other than normal measurement, peak measurement or differential measurement between gages can be performed.



542-063



542-067



542-064

SPECIFICATIONS

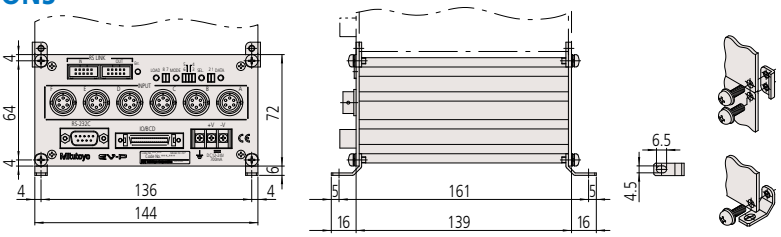
Order No.		542-063	542-067	542-064
Number of input channels		6		
Maximum input frequency		1.25 MHz (2-phase square wave), response speed depends on gage specification. Max. counting speed: 5 MHz		Response speed depends on gage specification.
Quantizing error		±1 count		
Resolution ( ) indicates maximum display range		10 µm (±999999.99 mm) / 0.0005 in (±9999.9995 in) 5 µm (±99999.995 mm) / 0.00005 in (±999.99995 in) 1 µm (±99999.999 mm) / 0.00005 in (±999.99995 in) 0.5 µm (±9999.9995 mm) / 0.000005 in (±99.999995 in) 0.1 µm (±9999.9999 mm) / 0.000005 in (±99.999995 in)* [Parameter set]		Depends on gage specification.
LED display		8 digits for parameter display (displays settings), 1 for error display		
Error message		Overspeed, gage error etc.		
External display		Dedicated external display unit **D-EV** (optional) can be connected.		
Number of input switches		4		
Function of input switches		Measurement mode switching, parameter setting		
Input/output	Tolerance judgment output	1 to 6 channels (L1, L2, L3), open-collector		
	BCD output	Parallel BCD output (positive/negative-true logic), open-collector		
	Segment output	A function to enable only output from the terminal corresponding to the counting values, open-collector		
	Control output	Open-collector		
	Control input	Output channel designation (segment, in the BCD mode), presetting, peak value clear, range changeover (at segment output), holding counting value open-collector or no-voltage contact signal (with/without contact point)		
Interface	RS-232C	Measurement data output and control input EIA RS-232C-compatible Use cross cables for home position, DTE (terminal definition).		
	RS link	Max. connecting unit: 10 Connecting cable length: Max. 10 m (sum of link cable length) Data transfer time: 1 sec./60 ch (when transmission rate is 19200 bps)		
Power supply	Voltage	12 to 24 V DC (terminal block: M3)		
	Consumption	8.4 W or less (700 mA max.) Ensure at least 1 A is available per unit.		
Operating temperature (humidity) ranges		0 to 40 °C (RH 20 to 80 %, non-condensing)		
Storage temperature (humidity) ranges		–10 to 50 °C (RH 20 to 80 %, non-condensing)		
Mass		Approx. 910 g	Approx. 910 g	Approx. 830 g
Standard Accessories		Fixing foot (4), connecting bracket (4), fixing screw M4×12 (8)		
Applicable gage head		**LGF**, **LGK**, **LGB**, **LGB2** Model with reference point mark is excluded.	**LGF** with reference point mark	**LGS**

* Available when using **D-EV**.

DIMENSIONS

Unit: mm

542-063



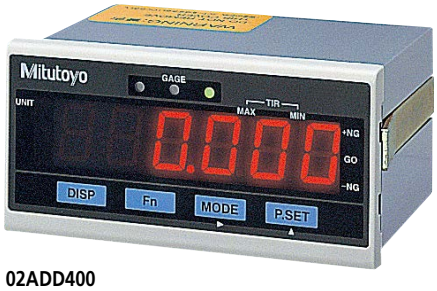
Linear Gages

Ideal for integration into harsh environments such as automation applications

D-EV
Display unit for the EV counter

G

- Display unit for the **EV** counter.
- Connecting this display unit helps configuration of the **EV** counter.
- Able to display each gage measurement value and GO/NG judgment result, total GO/NG judgment result for all gages, setting details, and errors.



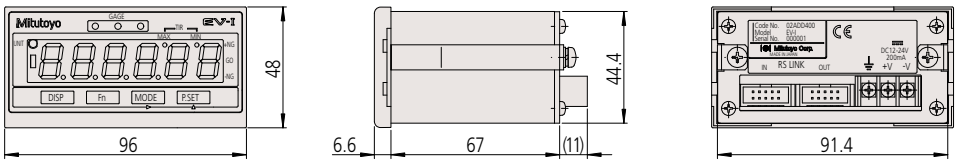
02ADD400

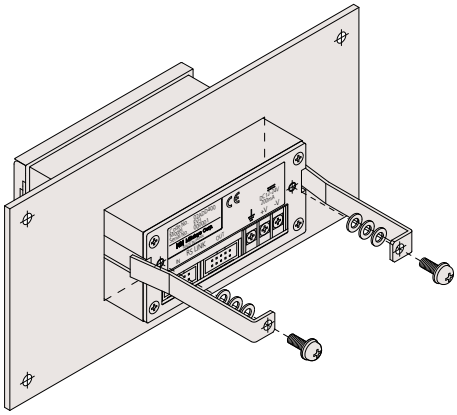
SPECIFICATIONS

Order No.	**02ADD400**
Number of connections	1 **EV** counter per unit
Number of digits	Sign plus 6 digits (8 digits internal to **EV** counter)
LED display	Channel display (also for judgment result display): 3 (3-color LED) Measurement mode display (current data, maximum value, minimum value, runout): 2 Status display: 1 (2 colors)
Operation switches	4
Function of operation switch	Channel switching, measurement mode switching (current data, maximum value, minimum value, runout), parameter setting, presetting, tolerance setting
Input/output	RS Link connectors: 1 each for IN, OUT
Error message	Overspeed, gage error etc.
Power supply	12 to 24 V DC, 200 mA (Terminal block: M3)
Operating temperature (humidity) ranges	0 to 40 °C (RH 20 to 80 %, non-condensing)
Storage temperature (humidity) ranges	–10 to 50 °C (RH 20 to 80 %, non-condensing)
External dimensions	96 (W) ×48 (H) ×84.6 (D) mm
Mass	150 g

DIMENSIONS

Unit: mm





Optional Accessories

- SPC cable (0.5 m): **02ADD950***1
- SPC cable (1 mm): **936937***1
- SPC cable (2 m): **965014***1
- AC adapter: **357651**
- AC cable (Japan): **02ZAA000***2
- AC cable (USA): **02ZAA010***2
- AC cable (EU): **02ZAA020***2
- AC cable (UK): **02ZAA030***2
- AC cable (China): **02ZAA040***2
- AC cable (Korea): **02ZAA050***2
- Terminal connecting cable: **02ADD930***2

*1 Required when connecting with **EV-16P/D/Z**.
*2 Required when using AC adapter.

Refer to the Linear Gage Brochure (**E13007**) for more details.

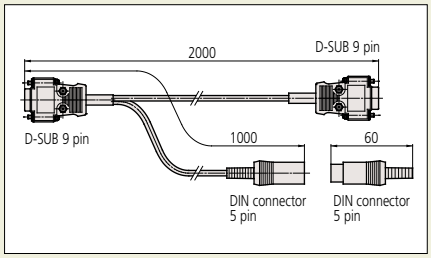
MeasurLink ENABLED
Data Management Software by Mitutoyo

Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).

MiCAT
Mitutoyo Intelligent Computer Aided Technology
the standard in world metrology software
SENSOR

Optional Accessories

• I/O cable: **21HZA137**



Communication cable (1 pc.)
Connection between PC and counter: 2 m
Input/output cable: 1 m
Input/output connector (1 pc.)

Refer to the Linear Gage Brochure (**E13007**) for more details.

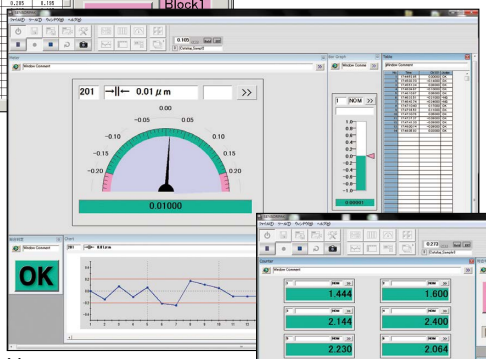
SENSORPAK
Measurement data loading software

MeasurLink® ENABLED
Data Management Software by Mitutoyo

G

- This software facilitates loading measurement data onto a personal computer from a linear gage counter with RS-232C output (**EH**, **EV**), with USB output (**EH**), or from a Litematic display (**VL**).
- 60 channels (max.) of measurement data can be processed.
- Arithmetical calculations and maximum width calculations can be performed using the measurement data.
- Exporting measurement data into MS-Excel format is supported.
- Real time graphical display by means of bar-graph or meter is provided.

Measurement screen



Meter screen

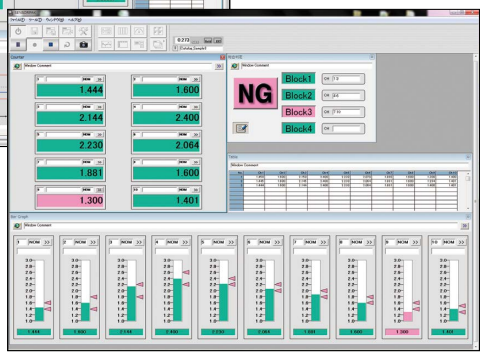


Chart screen

SPECIFICATIONS

Order No.		**02NGB072**
Product Configuration		Program disk (CD), license key, operation manual
Compatible devices (Connection method)		Mitutoyo RS_LINK compatible devices • **LGH** Series (USB, RS-232C) • **EH** counter (USB, RS-232C) • **EV** counter (RS-232C) • Litematic VL (RS-232C)
Connecting cable		A cable should be prepared to the following specifications: Accessory • RS-232C connection: I/O cable (**21HZA137**)*1 Commercial product • USB connection: USB cable (type A to type B) • RS-232C connection: RS-232C cross cable*1
Number of connectable gages		Max. 60 units (when 10 units of **EV** counter for linear gage are connected via RS-Link)
Functions	Display*2	Display format: counting, bar graph, indicator, chart, and table Display cycle: 1s (when 60 gage units are connected, 1-window display, and no Excel output)
	Calculation	Calculation (up to 30 items) between designated gages is available. Calculation items: Sum, difference, total, average, maximum, minimum, range (maximum–minimum), calculation with a constant
	Tolerance judgment	Per item: Displays the result in colors (3-step tolerance: red/green/red; 5-step tolerance: red/yellow/green/yellow/red) Total judgment: Displays in colors (red/green) by monitoring the multiple gages and calculation result
	Recording*2	Items: channel values, calculation result, tolerance judgment, total tolerance judgment, timestamp Max. number of records: 60000 for software recording (with 6 gages connected); up to 9000 (with 60 gages connected) Output function: Direct output to Excel, CSV file output (compatible with MeasurLink) Recording trigger: key, timer, external TRG
	Input/ output*3	Input: TRG for recording (HOLD) Output: Total tolerance judgment result
System Environment		DOS/V compatible PC environment CPU: Pentium4 2 GHz or more, Memory: 2 GB or more, Hard disk: 2 GB or more free space OS: Windows 7 (32 bit/64 bit), Windows 8.1 (32 bit/64 bit), Windows 10 (64 bit)

*1 If the PC is not equipped with an RS-232C port, please contact the nearest Mitutoyo sales office.
*2 Display cycle and the maximum number of records differ depending on the environment (specification of PC, number of connected gages, display format and communication setting).
*3 With use of the I/O cable (accessory). When an I/O cable is not used, the I/O connector of the counter alternatively functions. (Refer to the user's manual of the counter in use.)

Mitutoyo

Linear Gages

Ideal for integration into harsh environments such as automation applications

VL-50-B/50S-B Litematic
SERIES 318 — High-accuracy/resolution Measuring Machine

- With a measuring force of only 0.01 N, the Litematic is ideal for measuring easily deformed workpieces or high-accuracy components.
- For workpieces for which 0.01 N is insufficient, either the 0.15 N or 1 N model is recommended.
- The motor-driven spindle moves up/down and stops when the contact point touches the workpiece. Then the maximum, minimum and runout values are measured under a constant force.
- High resolution of 0.01 µm, and wide measuring range of 50 mm.
- Measuring system **VL-50-B**, integrated display type, and **VL-50S-B**, a separate display type, are available.
- The measuring table supplied with **VL-50-B** is ceramic, which is corrosion free, for easier maintenance and storage.
- The spindle is made of low thermal expansion material.
- Motor life is approximately 100,000 operations, after which replacement is advisable.

318-221

318-226

SPECIFICATIONS

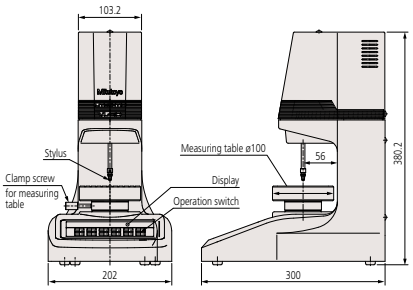
Order No.		318-221*4	318-222*4	318-223*4	318-226*4	318-227*4	318-228*4
Model		VL-50-B	VL-50-15-B	VL-50-100-B	VL-50S-B	VL-50S-15-B	VL-50S-100-B
Measuring range		0 to 50 mm (0 to 2 in)					
Resolution		0.01/0.1/1.0 µm (0.0000005 in/0.000005 in/0.00005 in)					
Display unit		8 digits/14 mm (0.6 in) character height (without signs)					
Scale type		Reflection type linear encoder					
Stroke		51.5 mm (2 in) (when using a standard contact point)					
Measuring accuracy (20 °C)*1		(0.5 + L/100) µm L=arbitrary measuring length (mm)					
Accuracy guaranteed temperature*2		20±1 °C					
Repeatability*1		σ=0.05 µm					
Measuring force*1		0.01 N	0.15 N*3	1 N*3	0.01 N	0.15 N*3	1 N*3
Feed speed	Measurement	Approx. 2 mm/s (0.08 in/s) or 4 mm/s (0.16 in/s) (changeable by parameter)					
	Fast feed	Approx. 8 mm/s (0.3 in/s)					
Contact point		ø3 mm carbide tipped (fixing screw: M2.5 (P=0.45) x5), standard contact point: **901312**					
Measuring table		ø100 (ceramic, grooved, removable)			—		
Input		Foot switch input (when optional foot switch is used) External Control					
Output		Digimatic output/RS-232C output (changeable by parameter)					
Rating	Power supply	85 to 264 V AC (depends on AC adapter)					
	Power consumption	Max. 12 W (12 V, 1 A)					
Standard Accessories		AC adapter: **357651**, Power cable: **02ZAA000**, Grounding wire: **934626**, AC cable (Japan): **02ZAA000**, AC cable (USA): **02ZAA010**, AC cable (EU): **02ZAA020**, AC cable (UK): **02ZAA030**, AC cable (China): **02ZAA040**, AC cable (Korea): **02ZAA050** Hex wrench (2 pcs. for fixing contact point and for removing fixing bracket)					

*1 Normal measurement using standard contact point.
*2 Under less temperature change, and hot or cold direct air flow should be avoided.
*3 0.15 N, 1 N types are factory-installed option.
*4 To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, D for CEE, DC for CCC, E for BS, F for SAA, K for KC, C and No suffix are required for PSE.
Note: Motor life is approximately 100,000 operations, after which replacement is advisable.
This maintenance factor is particularly important to bear in mind when the machine is used frequently, such as on a production line.

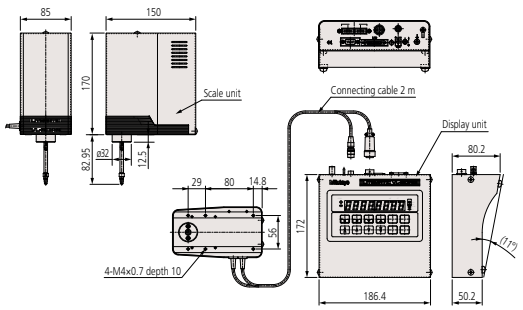
DIMENSIONS

Unit: mm

318-221

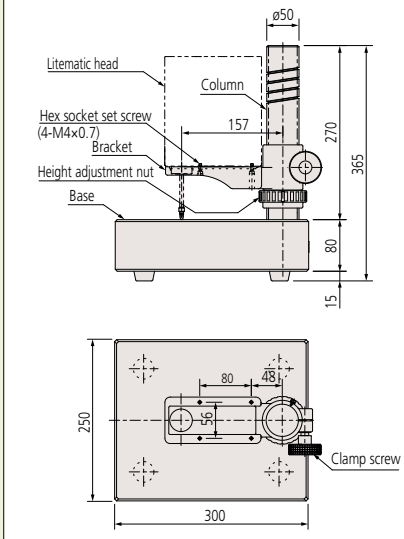


318-226



Optional Stand for VL-50S-B

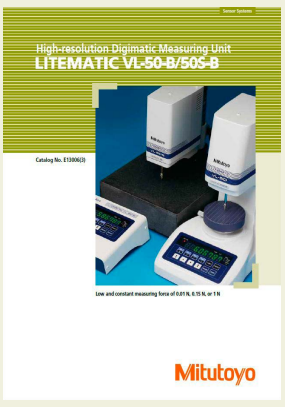
957460 Unit: mm



Optional Accessories

- Foot switch: **937179T**
- Dedicated stand: **957460***5
- SPC cable (1 m): **936937***6
- SPC cable (2 m): **965014***6
- VL weight part: **02AZE375***7
- Recommended spare contact points:
  Shell type: **101118** (Approx. 0.02 N)*8
  Carbide tipped spherical contact point, ø7.5: **120059** (Approx. 0.03 N)*8
  Carbide tipped spherical contact point, ø10.5: **120060** (Approx. 0.06 N)*8
  Carbide tipped needle contact point, ø0.45: **120066** (Approx. 0.01 N)*8

*5 Only **VL-50S** is available.
*6 Refer to page G-21 for details of the RS link.
*7 Not applicable to **318-223** and **318-228**
*8 Values in parentheses indicate the measuring force of a 0.01 N model fitted with the respective optional points

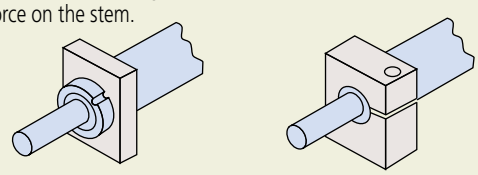


Refer to the Litematic Brochure (**E13006**) for more details.

Head

Plain Stem and Stem with Clamp Nut

The stem used to mount a linear gage head is classified as a "plain type" or "clamp nut type" as illustrated below. The clamp nut stem allows fast and secure clamping of the linear gage head. The plain stem has the advantage of wider application and slight positional adjustment in the axial direction on final installation, although it does requires a split-fixture clamping arrangement or adhesive fixing. However, take care so as not to exert excessive force on the stem.



Stem locknut type　　Plain stem

Measuring Force

This is the force exerted on a workpiece during measurement by the contact point of a linear gage head, at its stroke end, expressed in newtons.

Comparative Measurement

A measurement method where a workpiece dimension is found by measuring the difference in size between the workpiece and a master gage representing the nominal workpiece dimension.

Ingress Protection Code

IP54 protection code

Type	Level	Description
Protects the human body and protects against foreign objects	5: Dust protected	Protection against harmful dust
Protects against exposure to water	4: Splash-proof type	Water splashing against the enclosure from any direction shall have no harmful effect.

IP66 protection code

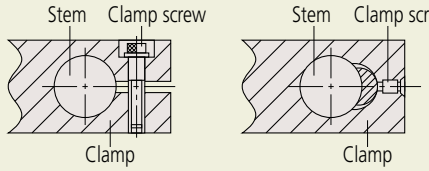
Type	Level	Description
Protection against contact with the human body and foreign objects	6: Dust tight	Protection from dust ingress Complete protection against contact
Protects against exposure to water	6: Water-resistant type	Water jets directed against the enclosure from any direction shall have no harmful effects.

Precautions in Mounting a Gage Head

- Insert the stem of the gage into the mounting clamp of a measuring unit or a stand and tighten the clamp screw.
- Notice that excessively tightening the stem can cause problems with spindle operation.
- Never use a mounting method in which the stem is clamped by direct contact with a screw.
- Never mount a linear gage by any part other than the stem.
- Mount the gage head so that it is in line with the intended direction of measurement. Mounting the head at an angle to this direction will cause an error in measurement.
- Exercise care so as not to exert a force on the gage through the cable.

Precautions in Mounting LGH Series

To fix the Laser Hologage, insert the stem into the dedicated stand or fixture.



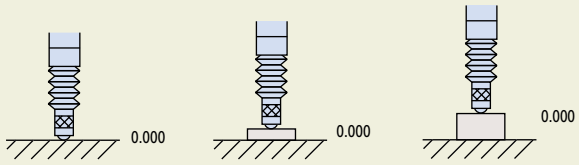
Recommended hole diameter on the fixing side: 15 mm +0.034/+0.014

- Machine the clamping hole so that its axis is parallel with the measuring direction. Mounting the gage at an angle will cause a measuring error.
- When fixing the Laser Hologage, do not clamp the stem too tightly. Over-tightening the stem may impair the sliding ability of the spindle.
- If measurement is performed while moving the Laser Hologage, mount it so that the cable will not be strained and no undue force will be exerted on the gage head.

Display Unit

Zero-setting

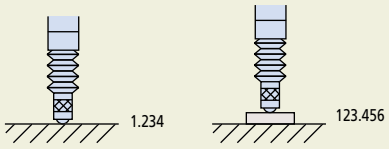
The display value can be set to 0 (zero) at any position of the spindle.



Note: Perform the zero-setting beyond 0.2 mm stroke from the rest position. This puts the spindle in the guaranteed accuracy region.

Presetting

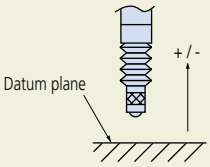
Any numeric value can be set on the display unit for starting the count from this value.



Note: Perform the zero-setting beyond 0.2 mm stroke from the rest position. This puts the spindle in the guaranteed accuracy region.

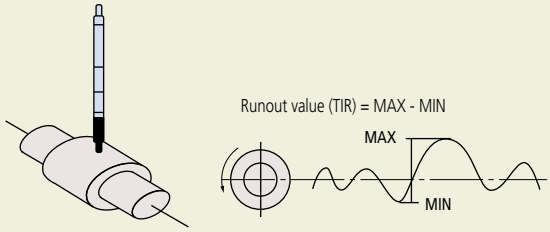
Direction Changeover

The measuring direction of the gage spindle can be set to either plus (+) or minus (-) of count.



MAX, MIN, TIR Settings

The display unit can hold the maximum (MAX) and minimum (MIN) values, and the run out value (TIR) during measurement.



Tolerance Setting

Tolerance limits can be set in various display units for automatically indicating if a measurement falls within those limits.

Open-collector Output

An external load, such as a relay or a logic circuit, can be driven from the collector output of an internal transistor which is itself controlled by a Tolerance Judgment result, etc.

Digimatic Code

A communication protocol for connecting the output of measuring tools with various Mitutoyo data processing units. This allows output connection to a Digimatic Mini Processor **DP-1VA LOGGER** for performing various statistical calculations and creating histograms, etc.

BCD Output

A system for outputting data in binary-coded decimal notation.

RS-232C Output

A serial communication interface in which data can be transmitted bi-directionally under the EIA Standards. For the transmission procedure, refer to the specifications of each measuring instrument.

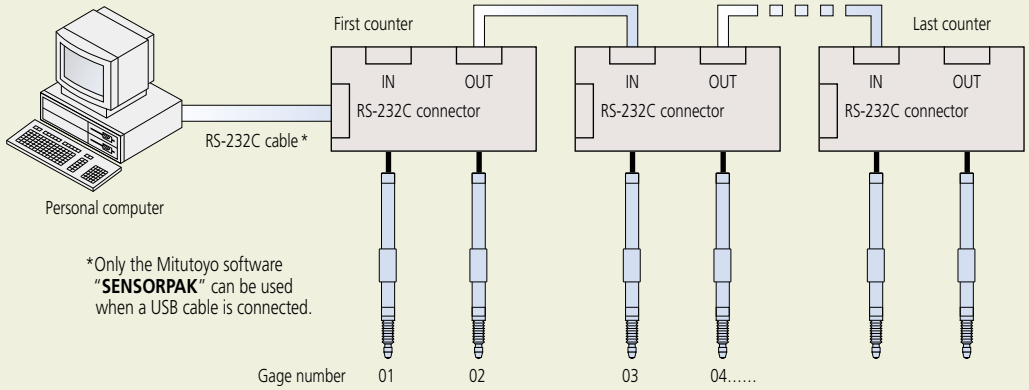
G

RS Link Function

Multi-point measurement can be performed by connecting multiple **EH** or **EV** counters with RS Link cables.

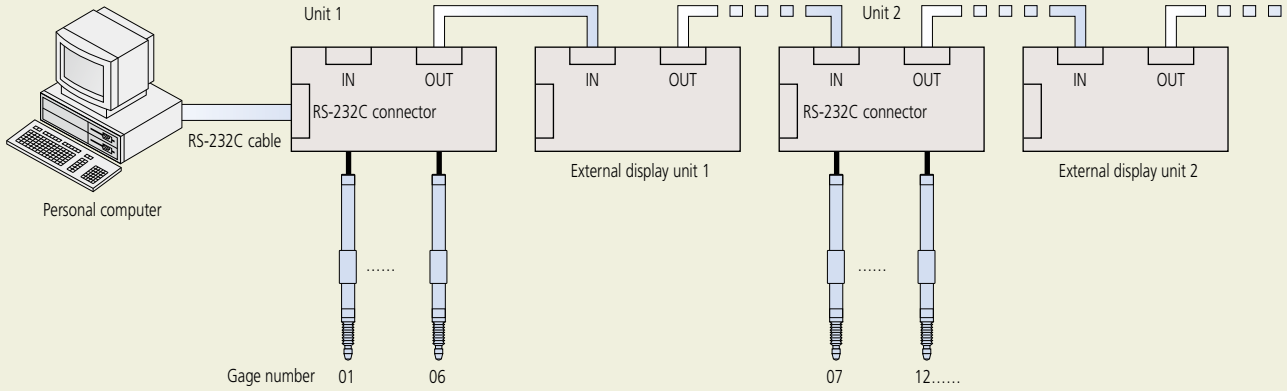
RS Link for EH Counter

It is possible to connect a maximum of 10 counter units and handle up to 20 channels of multi-point measurement at a time.
For this connection use a dedicated RS Link cable **02ADD950** (0.5 m), **936937** (1 m) or **965014** (2 m).
(The total length of RS Link cables permitted for the entire system is up to 10 m.)



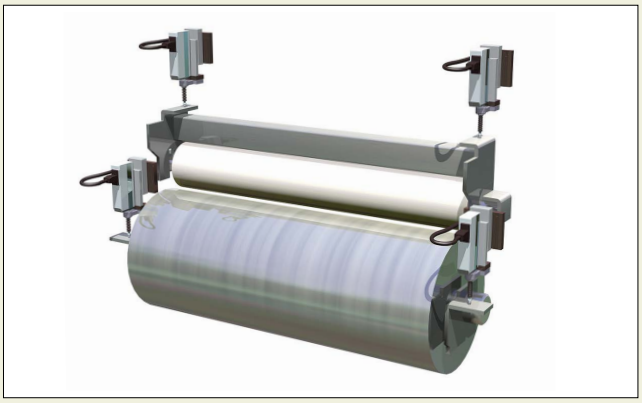
RS Link for EV Counter

It is possible to connect a maximum of 10* counter units and handle up to 60 channels of multi-point measurement at a time.
For this connection use a dedicated RS Link cable **02ADD950** (0.5 m), **936937** (1 m) or **965014** (2 m).
(The total length of RS Link cables permitted for the entire system is up to 10 m.)

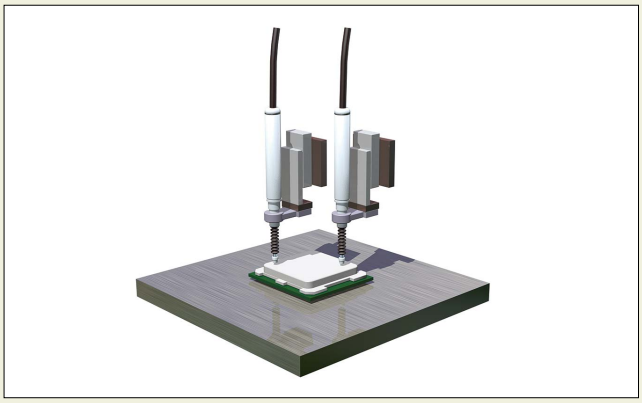


Measurement Examples

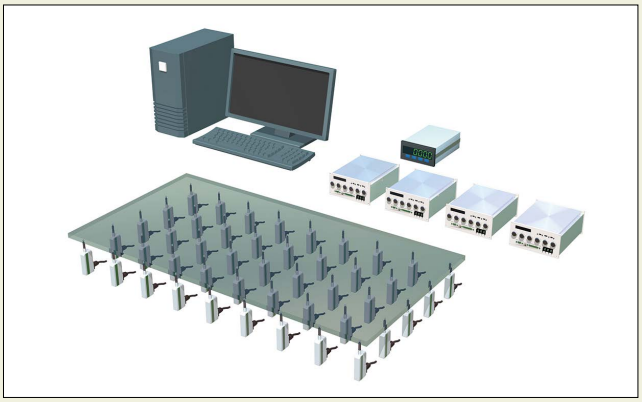
Roll gap measurement



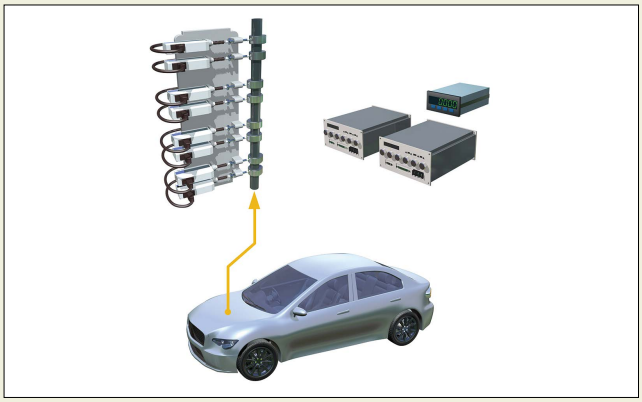
Chip parallelism measurement



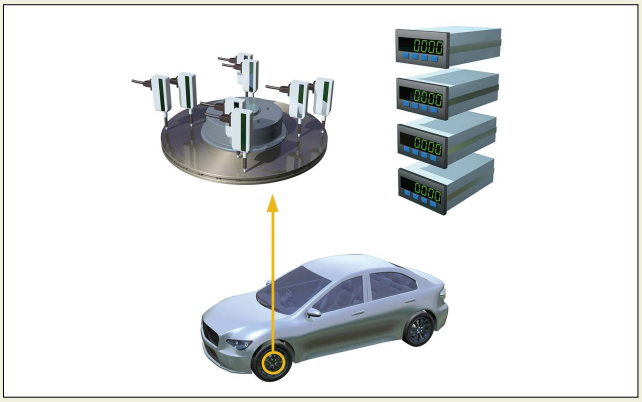
FPD board multipoint measurement



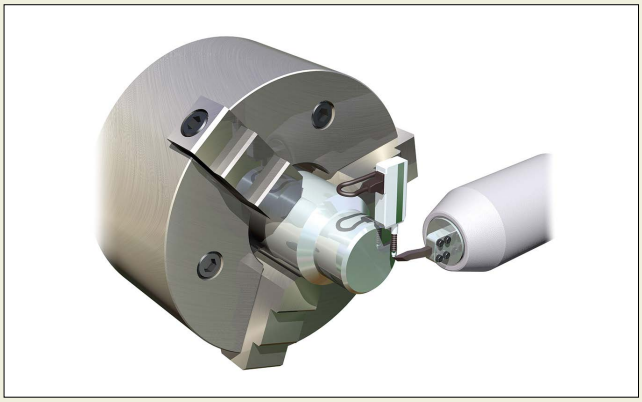
Cam-lift measurement



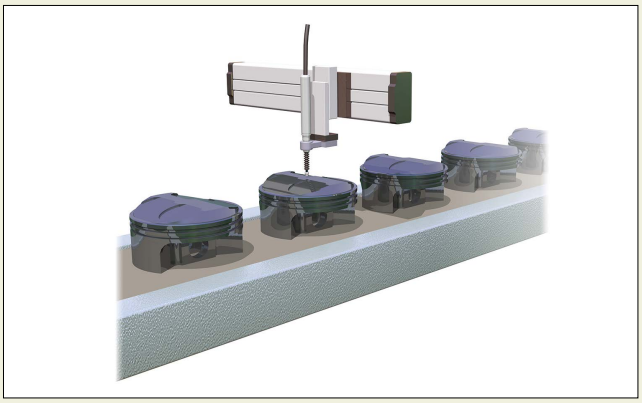
Brake disk multipoint measurement



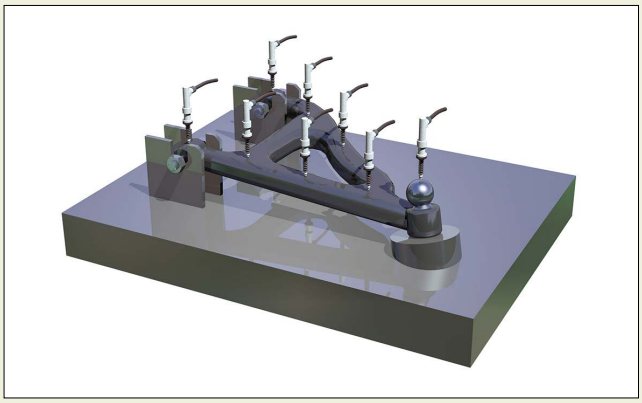
Machine device tool length measurement



Workpiece discrimination



Inspection fixture



Mu-checker

To support building a system with automatic measuring unit or dedicated gages

Lever/Cartridge Probe Heads
SERIES 519 — Electronic micrometer

Common specifications

- Connection: Half-bridge
- Cable length: 2 m
- Connector type: MAS-5100 (DIN5P) or equivalent

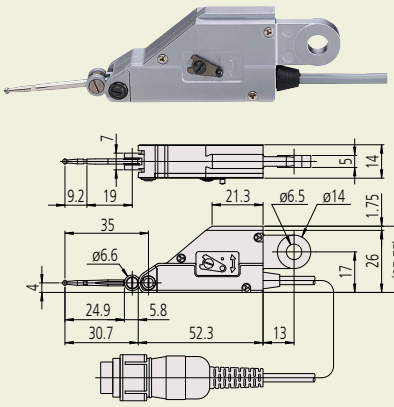
SPECIFICATIONS

Lever heads

Order No.	519-521	519-522	519-326	519-327
Measuring range (mm)	±0.5			
Stroke (mm)	±0.6			±0.65
Measuring force (N)	Approx. 0.2	Approx. 0.02	Approx. 0.15	
Linearity (%)	±0.3			±0.5
Stylus support	Pivot bearing	Pivot bearing	Parallel-leaf spring	Pivot bearing

Note: A ø2 mm ball-ended stylus is supplied as standard with all probes.

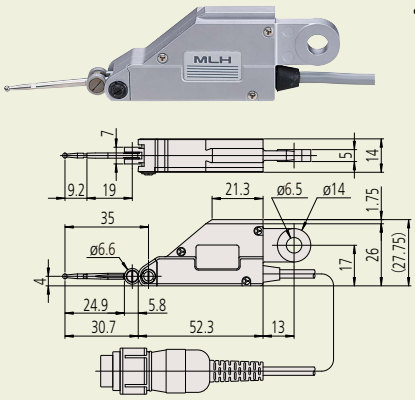
519-521



- Interchangeable styli:
  ø1: **520940** (Standard accessory)
  ø2: **520939** (Standard equipment)
  ø3: **520938** (Standard accessory)

Unit: mm

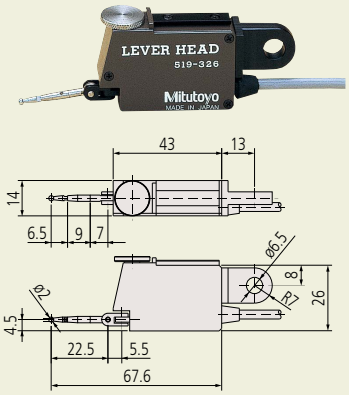
519-522



- Interchangeable styli:
  ø1: **520940** (Standard accessory)
  ø2: **520939** (Standard equipment)
  ø3: **520938** (Standard accessory)

Unit: mm

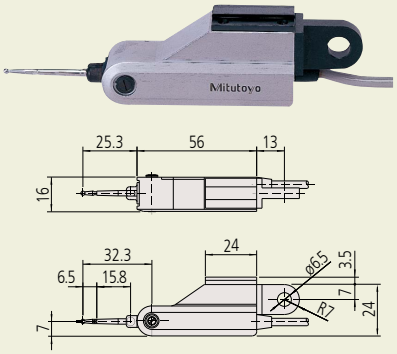
519-326



- Interchangeable styli:
  ø1: **102824** (Optional)
  ø2: **102825** (Standard equipment)
  ø3: **102826** (Optional)

Unit: mm

519-327



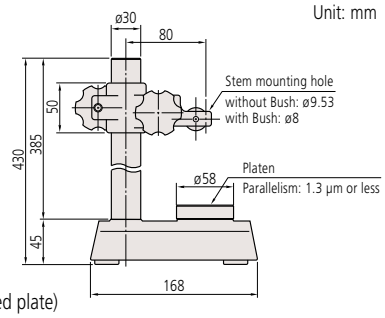
- Interchangeable styli:
  ø1: **102824** (Optional)
  ø2: **102825** (Standard equipment)
  ø3: **102826** (Optional)

Unit: mm

Transfer Stand

519-109-10
(with a serrated plate)

Unit: mm



Main Specifications

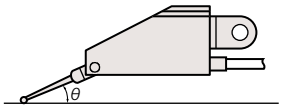
Order No.	Effective transfer range (mm)	Fine adjustment range (mm)	Mounting hole (mm)
519-109-10	0 - 320	1	Without Bush: ø9.53 With Bush: ø8

Note on stylus angle

If the stylus of a pivot bearing type probe makes an angle with a workpiece surface, as in the figure, calibration should be performed for accurate measurement. Alternatively, the displayed value may be corrected by multiplying it by the appropriate correction factor as given in the table.

Model **519-326** does not need correction.

Angle (θ)	Correction factor
0°	1.00
10°	0.98
20°	0.94
30°	0.87
40°	0.77
50°	0.64
60°	0.50

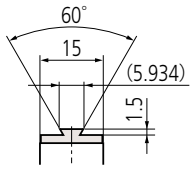


Display value × Correction factor = Corrected value

Dimensions of dovetail plate on probe body

Enables mounting on a lever head mounting bracket or stem.

Unit: mm



Lever-head mounting brackets (optional)

Optional accessories for Mitutoyo test indicators can be used.

Stems

ø4 dovetail-grooved stem
21CZB131

ø6 dovetail-grooved stem
21CZB128

ø8 dovetail-grooved stem
21CZB129

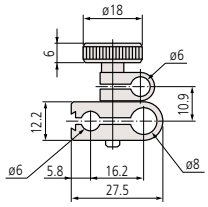
ø9.5 dovetail-grooved stem
21CZB130

Clamp

Clamp for ø6/8 dovetail-grooved stem
902053

Clamp for ø6/9.5 dovetail-grooved stem
900320

Unit: mm

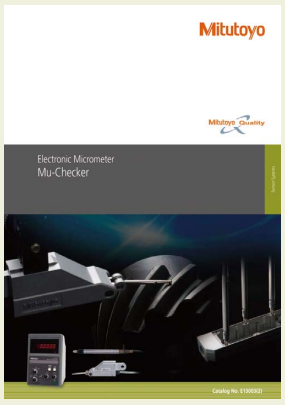


902053

Holder

Holding arm A (Square 9×9, Length 100)
900209

Holding arm B (ø8, Length 115)
900211



Refer to the Mu-checker Brochure (**E13003**) for more details.

SPECIFICATIONS

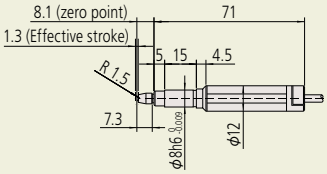
Cartridge heads (special order only)

Order No.	519-331	519-332	519-346	519-347	519-385	519-341	519-348
Measuring range (mm)	±0.5	±0.5	±0.25	±0.5	±1.5	±2.5	±1.0
Stroke (mm)	±0.65	±0.65	+0.34 −0.26	+0.85 −0.65	+2.35 −1.65	+3.2 −2.8	+1.35 −1.15
Measuring force (N)	Approx. 0.25	Approx. 0.25	Approx. 0.7	Approx. 0.7	Approx. 0.7	Approx. 0.9	Approx. 0.7
Stem Dia. (mm)	ø8	ø9.52	ø8	ø8	ø8	ø8	ø8
Linearity (%)	±0.5	±0.5	±0.3	±0.3	±0.3	±0.5	±0.3
Plunger support	Plain bearing		Linear ball-bearing				

519-331

- M2.5×5 interchangeable contact points for dial indicators can be used.

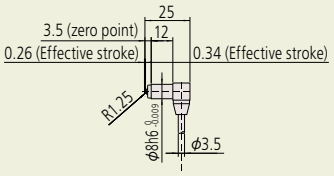
Unit: mm



519-346

- Dedicated contact point only that cannot be replaced.

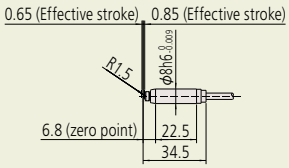
Unit: mm



519-347

- Dedicated contact point only that cannot be replaced.

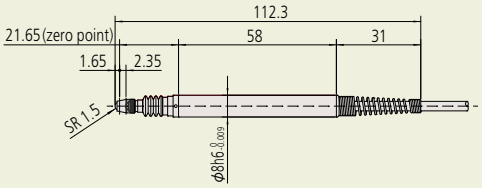
Unit: mm



519-385

- M2.5×5 interchangeable contact points for dial indicators can be used.

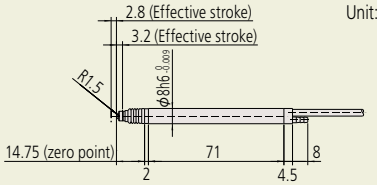
Unit: mm



519-341

- M2.5×5 interchangeable contact points for dial indicators can be used.
- Recommended air pressure 0.05 MPa

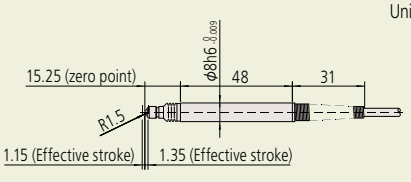
Unit: mm



519-348

- M2.5×5 interchangeable contact points for dial indicators can be used.

Unit: mm



G

Mu-checker

To support building a system with automatic measuring unit or dedicated gages

Display unit for Mu-checker (analog/digital) SERIES 519 — Electronic micrometer

- Single touch zero-set function is standard.
- Switchable measurement ranges make the Mu-checker suitable for a range of applications, especially those that involve moderately fast-changing measurement values which suit the use of analog readout.
- Two types of analog display are available and one digital type.

G

Analog Mu-checker

Standard type
519-551

Differential type
519-553

SPECIFICATIONS

	Metric		Inch	
Order No.	**519-551***	**519-553***	**519-552***	**519-554***
Type	Standard type (one probe required)	Differential type (one/two probes required)	Standard type (one probe required)	Differential type (one/two probes required)
Display range	±5 µm/±15 µm/±50 µm/±150 µm/±500 µm/±1500 µm		±5 µm/±15 µm/±50 µm/±150 µm/±500 µm/±1500 µm ±0.00015 in/±0.0005 in/±0.0015 in/±0.005 in/±0.015 in/±0.05 in	
Graduation	0.1 µm/0.5 µm/1 µm/5 µm/10 µm/50 µm		0.1 µm/0.5 µm/1 µm/5 µm/10 µm/50 µm 0.000005 in/0.00001 in/0.00005 in/0.0001 in/0.0005 in/0.001 in	
Differential mode	±A	±A, ±B, ±A±B	±A	±A, ±B, ±A±B
Display accuracy (linearity)	±1 % of full-scale reading			
Analog output	±1.0 V at full-scale reading			
Analog output accuracy	Within ±0.1 % of full-scale reading (excluding probe)			
Zero-setting adjustment range	±15 %/FS (error: ±0.2 %/FS)			
External dimensions	134 (W) ×183 (D) ×208 (H) mm			
Mass	2.4 kg			
Power input	AC adapter 100, 120, 220, 240 V AC 50/60 Hz			
Probe	Various probes (refer to pages G-23 and G-24)			

* To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, D for CEE, DC for CCC, E for BS, K for KC, C and No suffix are required for PSE.

Digital Mu-checker

Digital Mu-checker
519-561

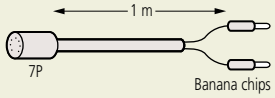
SPECIFICATIONS

	Metric	Inch
Order No.	**519-561***	**519-562***
Type	Differential type digital Mu-Checker (2 connecting heads)	
Display range	±2.000 mm/±0.2000 mm	±2.000 mm/±0.2000 mm/±0.08 in/±0.008 in
Resolution	0.001 mm/0.0001 mm	0.001 mm/0.0001 mm/0.00005 in/0.000005 in
Differential mode	±A, ±B, ±A±B	
Measurement mode	ABS/CMP	
Analog output	±1 V at full-scale reading	
Digital output	Digimatic code out	
External dimensions	134 (W) ×183 (D) ×208 (H) mm	
Mass	Approx. 2.6 kg	
Power input	AC adapter 100, 120, 220, 240 V AC 50/60 Hz	
Probe	Various probes (refer to pages G-23 and G-24)	

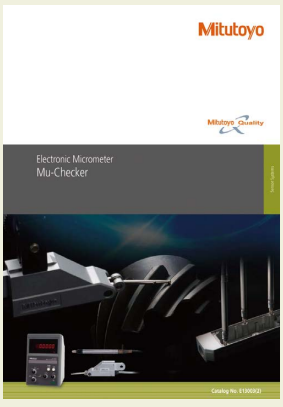
* To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, D for CEE, DC for CCC, E for BS, K for KC, C and No suffix are required for PSE.

Optional Accessories

- Vertical stand (**271214**)
  Attached to the bottom surface of the Mu-checker, it can be vertically mounted on the base.
- SPC Cable for connecting digital Mu-checker (**936937**)
  Used for connecting to the Digimatic mini-processor.
- Output cable A (**934795**)
  Used for connecting to external devices, such as data recorders, etc.



- Analog, limit out (7P) connector (**529035**)
  Used for output to external data recorders, sequencers, etc.



Refer to the Mu-checker Brochure (**E13003**) for more details.

Main features

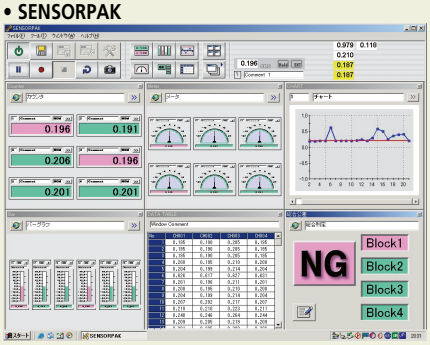
- External control (Zero-set, Preset etc.)
- Direction switching
- Error messaging
- Tolerance judgment output
- Each data output (RS-232C, BCD, segment)
- Peak measurement (maximum value, minimum value, runout) and arithmetic operation (addition, average, maximum value, minimum value, maximum width) between axes

Optional Accessories

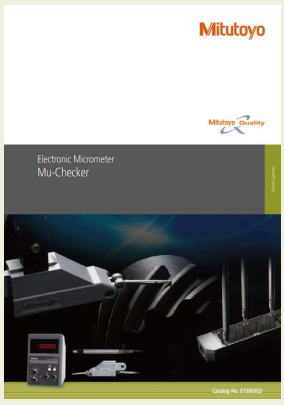
- Output connector: **02ADB440**
- D-EV External display unit*1: **02ADD400**
- SPC cable (0.5 m): **02ADD950**
- SPC cable (1 m): **936937**
- SPC cable (2 m): **965014**
- AC adapter: **357651**
- AC cable (Japan): **02ZAA000***2
- AC cable (USA): **02ZAA010***2
- AC cable (EU): **02ZAA020***2
- AC cable (UK): **02ZAA030***2
- AC cable (China): **02ZAA040***2
- AC cable (Korea): **02ZAA050***2
- Terminal connecting cable: **02ADD930***2

*1 Refer to page G-17 for details of **D-EV**.
*2 Required when using AC adapter.

- **SENSORPAK**



Note: Refer to page G-18 for more details.



Refer to the Mu-checker Brochure (**E13003**) for more details.

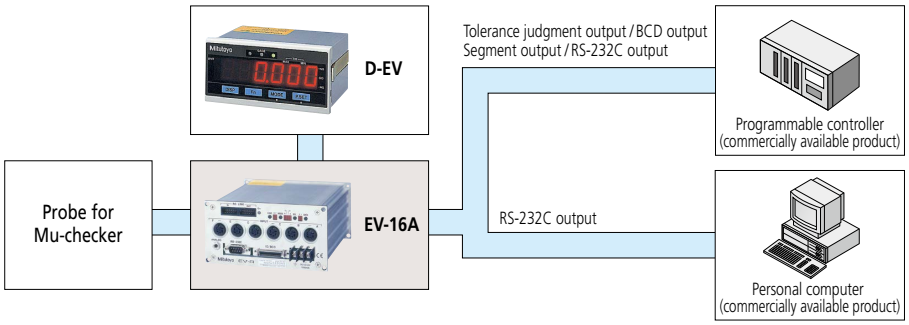
EV-16A Counter
SERIES 519 — 6-channel, No-display Type

519-355
EV-16A

- Up to six probes can be connected to one unit. Up to ten counters can be connected to one personal computer using the RS Link function to enable the configuration of a multi-point measurement system comprising a maximum of 60 gages.
- I/O outputs for RS-232C, BCD, tolerance judgment and segment output are available.
- Maximum, minimum and runout measurement between channels (in the same unit) is possible in addition to normal measurement on individual channels.

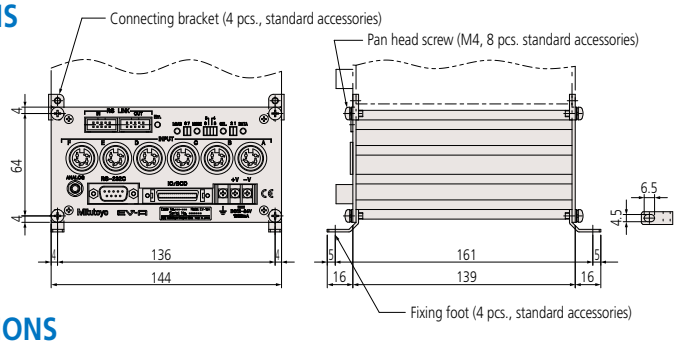
SYSTEM CONFIGURATION

Mitutoyo probes, **EV-16A** counters and **D-EV** display units combined with commercial controllers and personal computers enable construction of a powerful, multi-channel system that can be built to meet the needs of almost any measurement application.



DIMENSIONS

Unit: mm



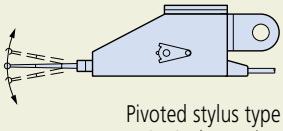
SPECIFICATIONS

Order No.		519-355
Number of gage inputs		6
Quantizing error		±1 count
Display range (mm)		±2.000, ±0.200
Resolution (mm)		0.001, 0.0001
Display processing		8 digits for parameters (display setting), 1 for error display
Error messaging		Power supply voltage error, Gage error, etc.
External display		Dedicated external display unit **D-EV** (optional) can be connected
Number of input switches		4
Input switch function		Measurement mode switching, Parameter settings
I/O	Tolerance judgment output	1 to 6 gages (L1, L2, L3), open-collector
	BCD output	Parallel BCD output (positive/negative-true logic), open-collector
	Segment output	A function to enable only output from the terminal corresponding to the counting values, open-collector
	Control output	Normal operation signal (NOM), open-collector
	Control input	Output channel designation (segment, in BCD mode), presetting, peak value clear, range changeover (at segment output), holding counting value, open-collector or no-voltage contact signal (with/without contact point)
Interface	RS-232C	Measurement data output and control input, EIA RS-232C-compatible Use cross cables for home position DTE (terminal definition)
	RS link	Max. connected units: 10 Connecting cable length: Max. 10 m (sum of link cable length) Data transfer time: 1.1 sec./60 ch (when transmission rate is 19200 bps)
Power supply	Voltage	12 to 24 V DC (Terminal block: M3)
	Consumption	1 A
Operating temperature (humidity) ranges		0 to 40 °C (RH 20 to 80 %, non-condensing)
Storage temperature (humidity) ranges		-10 to 50 °C (RH 20 to 80 %, non-condensing)
External dimensions		144 (W) ×72 (H) ×139 (D) mm
Mass		Approx. 1000 g
Standard accessories		Fixing foot (4), connecting bracket (4), fixing screw M4×8 (8)
Applicable probes		For probes, refer to pages G-23 and G-24.

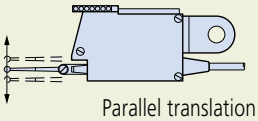
Electronic Micrometer

Probe
A sensor that converts movement of a contact point, on a stylus or plunger, into an electrical signal.

Lever probes
Lever probes are available in two types. The most common type uses a pivoted stylus so the contact point moves in a circular arc; this type is subject to cosine effect and, therefore, measurements may require linearity correction if the direction of measurement is much different to the direction of movement of the contact point. The less common type uses a parallel translation leaf-spring mechanism so contact point movement is linear; this type requires no correction.

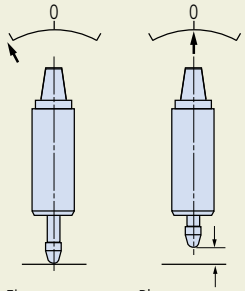


Pivoted stylus type
519-521 (measuring direction can be switched with the up/down lever)
519-522 (measuring direction is not switchable)



Parallel translation type
519-326 (measuring direction can be switched with the upper dial)

Pre-travel
The distance from first contact with a workpiece until the measurement indicator reads zero.



First contact. Plunger moves until the indicator reads zero.

Measuring force
The force applied to the workpiece by the probe when the indicator registers zero. It is indicated in newtons (N).

Digimatic code
A communication protocol for connecting the output of measuring tools with various Mitutoyo data processing units. This allows output connection to a Digimatic Mini Processor **DP-1VA LOGGER** for performing various statistical calculations and creating histograms, etc.

Open-collector output
A direct connection to the collector of a driving transistor.

Comparative measurement
A measurement method where a workpiece dimension is found by measuring the difference in size between the workpiece and a master gage that represents the nominal dimension.
This method is usually applied when the measurement to be made is greater than the measuring range of the instrument.

Linearity
The ratio of proportionality between measuring system output and measured distance.
If this is not constant within acceptable limits then correction is required.

0 (zero) point
A reference point on the master gage in a comparative measurement.

Sensitivity
The ratio of the electric micrometer output signal to the input signal to the amplifier. The sensitivity is normal if a value as expected from the given displacement is displayed.

Tolerance setting
Tolerance limits can be set on the electronic micrometer to provide an automatic judgment as to whether a measured value falls within the tolerance.

Laser Scan Micrometer

Non-contact, high-speed, high-precision measurement

LSM-500S Measuring Unit
SERIES 544 — 5 µm to 2 mm Measuring Unit

- Capable of measuring down to 5 µm outside diameter.
- Provides ultra-high accuracy of ±0.3 µm over the entire measuring range (5 µm to 2 mm).

With signal cable (5 m)
02AGN770A

SPECIFICATIONS

Order No.		**544-531**	**544-532**
Applicable laser standards		JIS	IEC, FDA
User's Manual		Japanese version	English version
Measuring range		0.005 to 2 mm*1	
Resolution		0.01 to 10 µm (selectable)	
Repeatability*2		±0.03 µm	
Linearity*3 (20 °C)		±0.3 µm	
Positional error*4		±0.4 µm	
Measuring region*5		1×2 mm (0.005 to 2 mm)	
Scanning rate		3200 scans/s	
Laser wavelength		650 nm (Visible)	
Laser scanning speed		76 m/s	
Operating environment	Temperature	0 to 40 °C	
	Humidity	RH 35 to 85 % (non-condensing)	
Protection Level		IP64*6	

*1 The measuring range for a transparent object is 0.05 mm to 2 mm. Please consult your local Mitutoyo office for objects smaller than 0.05 mm.
The measuring range is 0.1 mm to 2 mm in the 1 to 255 edge measurement mode or when activating automatic workpiece detection.
If using the optional dual connection unit for **LSM-6200**, the measuring range will be 0.05 mm to 2 mm.
*2 Determined at the level of ±2σ (σ: standard deviation) when measuring ø2 mm at the interval of 0.32 sec. (average 1024 times).
*3 Applies at the center of the measuring range when measuring outside diameters.
*4 An error in outside diameter measurement due to variation in workpiece position either in the optical axis direction or in the scanning direction.
*5 The area defined by [optical axis depth]×[scanning width].
*6 The protection level provided for the interior. If the workpiece or glass of the measuring unit window is soiled by water or dust, the unit may malfunction.
Note: When using the extra-fine line measurement function (FINE), guide messages for setting the following will not be displayed: dual-measurement, segment designation, automatic workpiece detection, and group judgment.

LSM-501S Measuring Unit
SERIES 544 — 50 µm to 10 mm Measuring Unit

- Provides ultra-high accuracy of ±0.5 µm over the entire measuring range (0.05 to 10 mm).
- The industry's first narrow-range accuracy performance in this measuring range of ±(0.3+0.1ΔD) µm is available for high-accuracy measurement.

With signal cable (5 m)
02AGN770A

SPECIFICATIONS

Order No.		**544-533**	**544-534**
Applicable laser standards		JIS	IEC, FDA
User's Manual		Japanese version	English version
Measuring range		0.05 to 10 mm	
Resolution		0.01 to 10 µm (selectable)	
Repeatability*1		±0.04 µm	
Linearity*2 (20 °C)	Whole range	±0.5 µm	
	Narrow range	±(0.3+0.1ΔD) µm*3	
Positional error*4		±0.5 µm	
Measuring region*5		2×10 mm (0.05 to 0.1 mm) 4×10 mm (0.1 to 10 mm)	
Scanning rate		3200 scans/s	
Laser wavelength		650 nm (Visible)	
Laser scanning speed		113 m/s	
Operating environment	Temperature	0 to 40 °C	
	Humidity	RH 35 to 85 % (non-condensing)	
Protection Level		IP64*6	

*1 Determined at the level of ±2σ (σ: standard deviation) when measuring ø10 mm at the interval of 0.32 sec. (average 1024 times).
*2 Applies at the center of the measuring range when measuring outside diameters.
*3 ΔD=Difference in diameter between the master gage and workpiece. (Unit: mm)
*4 An error in outside diameter measurement due to variation in workpiece position either in the optical axis direction or in the scanning direction.
*5 The area defined by [optical axis depth]×[scanning width].
*6 The protection level provided for the interior. If the workpiece or glass of the measuring unit window is soiled by water or dust, the unit may malfunction.

Optional Accessories

- Multifunctional display unit, **LSM-6200**:

Order No.	Display type	Remarks
544-071	Japanese mm/E	Japanese user's manual
544-071*	English mm/E	English user's manual
544-072*	English mm/in	

* To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, D for CEE, DC for CCC, E for BS, F for SAA, K for KC, C and No suffix are required for PSE."

- Panel-mount type display unit, **LSM-5200**:

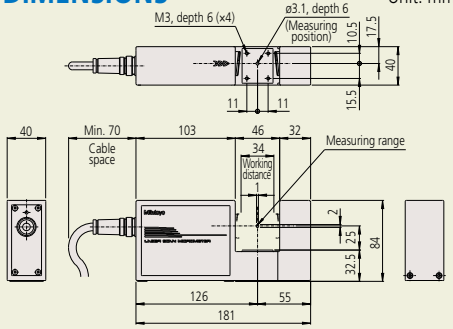
Order No.	Remarks
544-046	Japanese user's manual
544-047	English user's manual

- Standard calibration gage set (ø0.1, ø2.0) : **02AGD110**
- Guide pulley : **02AGD200**
- Air blower : **02AGD220**
- Extension signal cable (max. 15 m)

Order No.	Cable length
02AGN780A	5 m
02AGN780B	10 m
02AGN780C	15 m

DIMENSIONS

Unit: mm



Optional Accessories

- Multifunctional display unit, **LSM-6200**:

Order No.	Display type	Remarks
544-071	Japanese mm/E	Japanese user's manual
544-071*	English mm/E	English user's manual
544-072*	English mm/in	

* To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, D for CEE, DC for CCC, E for BS, F for SAA, K for KC, C and No suffix are required for PSE."

- Panel-mount type display unit, **LSM-5200**:

Order No.	Remarks
544-046	Japanese user's manual
544-047	English user's manual

- Standard calibration gage set (ø0.1, ø10.0): **02AGD120**
- Wire guiding pulley : **02AGD210**
- Adjustable workstage : **02AGD400**
- Air blower : **02AGD230**
- Workstage : **02AGD270**
- Extension signal cable (max. 15 m)

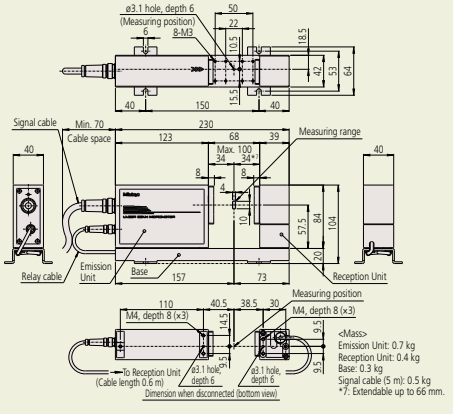
Order No.	Cable length
02AGN780A	5 m
02AGN780B	10 m
02AGN780C	15 m

- Extension relay cable

Order No.	Cable length
02AGC150A	1 m

DIMENSIONS

Unit: mm



Optional Accessories

• Multifunctional display unit, **LSM-6200**:

Order No.	Display type	Remarks
544-071	Japanese mm/E	Japanese user's manual
544-071*	English mm/E	English user's manual
544-072*	English mm/in	

* To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, D for CEE, DC for CCC, E for BS, F for SAA, K for KC, C and No suffix are required for PSE."

• Panel-mount type display unit, **LSM-5200**:

Order No.	Remarks
544-046	Japanese user's manual
544-047	English user's manual

• Standard calibration gage set (ø1.0, ø30.0) : **02AGD130**
• Adjustable workstage : **02AGD490**
• Air blower : **02AGD240**
• Workstage : **02AGD270**
• Extension signal cable (max. 25 m)

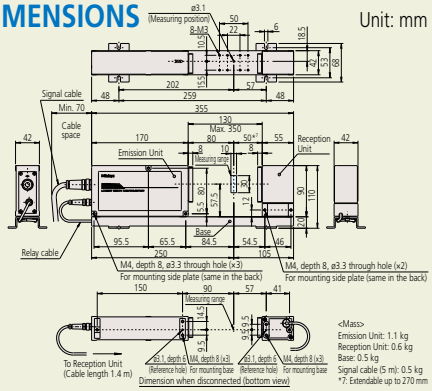
Order No.	Cable length
02AGN780A	5 m
02AGN780B	10 m
02AGN780C	15 m
02AGN780D	20 m

• Extension relay cable (max. 5 m)

02AGC150A	1 m
02AGC150B	3 m
02AGC150C	5 m

DIMENSIONS

Unit: mm



Optional Accessories

• Multifunctional display unit, **LSM-6200**:

Order No.	Display type	Remarks
544-071	Japanese mm/E	Japanese user's manual
544-071*	English mm/E	English user's manual
544-072*	English mm/in	

* To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, D for CEE, DC for CCC, E for BS, F for SAA, K for KC, C and No suffix are required for PSE."

• Panel-mount type display unit, **LSM-5200**:

Order No.	Remarks
544-046	Japanese user's manual
544-047	English user's manual

• Standard calibration gage set (ø0.1, ø60.0) : **02AGD140**
• Adjustable workstage : **02AGD520**
• Air blower : **02AGD250**
• Extension signal cable (max. 25 m)

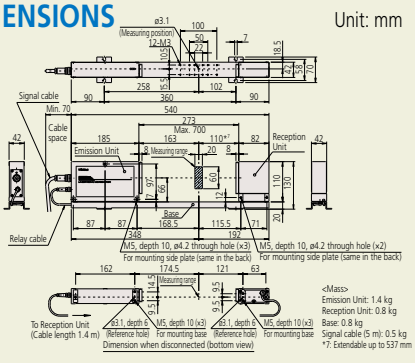
Order No.	Cable length
02AGN780A	5 m
02AGN780B	10 m
02AGN780C	15 m
02AGN780D	20 m

• Extension relay cable (max. 5 m)

02AGC150A	1 m
02AGC150B	3 m
02AGC150C	5 m

DIMENSIONS

Unit: mm



LSM-503S Measuring Unit
SERIES 544 — 0.3 mm to 30 mm Measuring Unit

• Ensures ±1.0 µm accuracy over the entire measuring range (0.3 to 30 mm).
• The industry's first narrow-range accuracy performance in this measuring range of ±(0.6+0.1ΔD) µm is available for high-accuracy measurement.

With signal cable (5 m)
02AGN770A

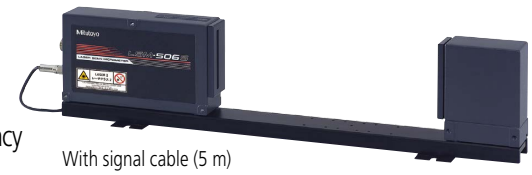
SPECIFICATIONS

Order No.		**544-535**	**544-536**
Applicable laser standards		JIS	IEC, FDA
User's Manual		Japanese version	English version
Measuring range		0.3 to 30 mm	
Resolution		0.02 to 100 µm (selectable)	
Repeatability*1		±0.11 µm	
Linearity*2 (20 °C)	Whole range	±1.0 µm	
	Narrow range	±(0.6+0.1ΔD) µm*3	
Positional error*4		±1.5 µm	
Measuring region*5		10×30 mm (0.3 to 30 mm)	
Scanning rate		3200 scans/s	
Laser wavelength		650 nm (Visible)	
Laser scanning speed		226 m/s	
Operating environment	Temperature	0 to 40 °C	
	Humidity	RH 35 to 85 % (non-condensing)	
Protection Level		IP64*6	

*1 Determined at the level of ±2σ (σ: standard deviation) when measuring ø30 mm at the interval of 0.32 sec. (average 1024 times).
*2 Applies at the center of the measuring range when measuring outside diameters.
*3 ΔD=Difference in diameter between the master gage and workpiece (Unit: mm)
*4 An error in outside diameter measurement due to variation in workpiece position either in the optical axis direction or in the scanning direction.
*5 The area defined by [optical axis depth]×[scanning width].
*6 The protection level provided for the interior. If the workpiece or glass of the measuring unit window is soiled by water or dust, the unit may malfunction.

LSM-506S Measuring Unit
SERIES 544 — 1 mm to 60 mm Measuring Unit

• Ensures ±3 µm accuracy over the entire measuring range (1 to 60 mm).
• The industry's first narrow-range accuracy performance in this measuring range of ±(1.5+0.5ΔD) µm is available for high-accuracy measurement.



With signal cable (5 m)
02AGN770A

SPECIFICATIONS

Order No.		**544-537**	**544-538**
Applicable laser standards		JIS	IEC, FDA
User's Manual		Japanese version	English version
Measuring range		1 to 60 mm	
Resolution		0.05 to 100 µm (selectable)	
Repeatability*1		±0.36 µm	
Linearity*2 (20 °C)	Whole range	±3 µm	
	Narrow range	±(1.5+0.5ΔD) µm*3	
Positional error*4		±4 µm	
Measuring region*5		20×60 mm (1 to 60 mm)	
Scanning rate		3200 scans/s	
Laser wavelength		650 nm (Visible)	
Laser scanning speed		452 m/s	
Operating environment	Temperature	0 to 40 °C	
	Humidity	RH 35 to 85 % (non-condensing)	
Protection Level		IP64*6	

*1 Determined at the level of ±2σ (σ: standard deviation) when measuring ø60 mm at the interval of 0.32 sec. (average 1024 times).
*2 Applies at the center of the measuring range when measuring outside diameters.
*3 ΔD=Difference in diameter between the master gage and workpiece (Unit: mm)
*4 An error in outside diameter measurement due to variation in workpiece position either in the optical axis direction or in the scanning direction.
*5 The area defined by [optical axis depth]×[scanning width].
*6 The protection level provided for the interior. If the workpiece or glass of the measuring unit window is soiled by water or dust, the unit may malfunction.

Mitutoyo

Laser Scan Micrometer

Non-contact, high-speed, high-precision measurement

LSM-512S Measuring Unit
SERIES 544 — 1 mm to 120 mm Measuring Unit

- Ensures ±6 µm accuracy over the entire measuring range (1 to 120 mm).
- The industry's first narrow-range accuracy performance in this measuring range of ±(4.0+0.5ΔD) µm is available for high-accuracy measurement.

With signal cable (5 m)
02AGN770A

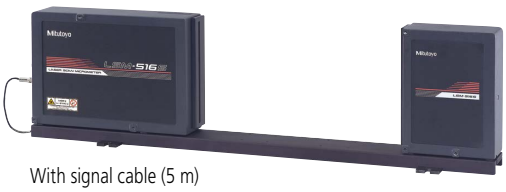
SPECIFICATIONS

Order No.		544-539	544-540
Applicable laser standards		JIS	IEC, FDA
User's Manual		Japanese version	English version
Measuring range		1 to 120 mm	
Resolution		0.1 to 100 µm (selectable)	
Repeatability*1		±0.85 µm	
Linearity*2 (20 °C)	Whole range	±6 µm	
	Narrow range	±(4.0+0.5ΔD) µm*3	
Positional error*4		±8 µm	
Measuring region*5		30×120 mm (1 to 120 mm)	
Scanning rate		3200 scans/s	
Laser wavelength		650 nm (Visible)	
Laser scanning speed		904 m/s	
Operating environment	Temperature	0 to 40 °C	
	Humidity	RH 35 to 85 % (non-condensing)	
Protection Level		IP64*6	

*1 Determined at the level of ±2σ (σ: standard deviation) when measuring ø120 mm at the interval of 0.32 sec. (average 1024 times).
*2 Applies at the center of the measuring range when measuring outside diameters.
*3 ΔD=Difference in diameter between the master gage and workpiece (Unit: mm)
*4 An error in outside diameter measurement due to variation in workpiece position either in the optical axis direction or in the scanning direction.
*5 The area defined by (optical axis depth)×(scanning width).
*6 The protection level provided for the interior. If the workpiece or glass of the measuring unit window is soiled by water or dust, the unit may malfunction.

LSM-516S Measuring Unit
SERIES 544 — 1 mm to 160 mm Measuring Unit

- Ensures ±7 µm accuracy over the entire measuring range (1 to 160 mm).
- The industry's first narrow-range accuracy performance in this measuring range of ±(4.0+2.0ΔD) µm is available for high-accuracy measurement.



With signal cable (5 m)
02AGN770A

SPECIFICATIONS

Order No.		544-541	544-542
Applicable laser standards		JIS	IEC, FDA
User's Manual		Japanese version	English version
Measuring range		1 to 160 mm	
Resolution		0.1 to 100 µm (selectable)	
Repeatability*1		±1.4 µm	
Linearity*2 (20 °C)	Whole range	±7 µm	
	Narrow range	±(4.0+2.0ΔD) µm*3	
Positional error*4		±8 µm	
Measuring region*5		40×160 mm (1 to 160 mm)	
Scanning rate		3200 scans/s	
Laser wavelength		650 nm (Visible)	
Laser scanning speed		1206 m/s	
Operating environment	Temperature	0 to 40 °C	
	Humidity	RH 35 to 85 % (non-condensing)	
Protection Level		IP64*6	

*1 Determined at the level of ±2σ (σ: standard deviation) when measuring ø160 mm at the interval of 0.32 sec. (average 1024 times).
*2 Applies at the center of the measuring range when measuring outside diameters.
*3 ΔD=Difference in diameter between the master gage and workpiece (Unit: mm)
*4 An error in outside diameter measurement due to variation in workpiece position either in the optical axis direction or in the scanning direction.
*5 The area defined by (optical axis depth)×(scanning width).
*6 The protection level provided for the interior. If the workpiece or glass of the measuring unit window is soiled by water or dust, the unit may malfunction.

Optional Accessories

• Multifunctional display unit, **LSM-6200**:

Order No.	Display type	Remarks
544-071	Japanese mm/E	Japanese user's manual
544-071*	English mm/E	English user's manual
544-072*	English mm/in	

* To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, D for CEE, DC for CCC, E for BS, F for SAA, K for KC, C and No suffix are required for PSE."

• Panel-mount type display unit, **LSM-5200**:

Order No.	Remarks
544-046	Japanese user's manual
544-047	English user's manual

• Standard calibration gage set (ø20.0, ø120.0): **02AGD150**
• Air blower : **02AGD260**
• Extension signal cable (max. 25 m)

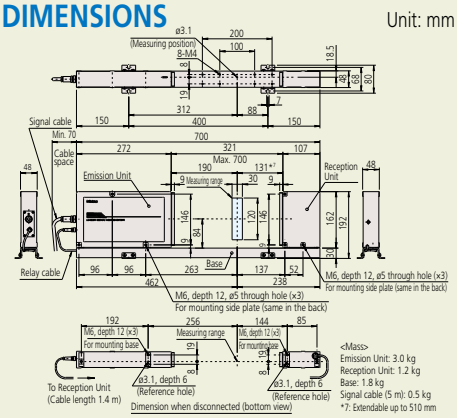
Order No.	Cable length
02AGN780A	5 m
02AGN780B	10 m
02AGN780C	15 m
02AGN780D	20 m

• Extension relay cable (max. 5 m)

02AGC150A	1 m
02AGC150B	3 m
02AGC150C	5 m

DIMENSIONS

Unit: mm



Optional Accessories

• Multifunctional display unit, **LSM-6200**:

Order No.	Display type	Remarks
544-071	Japanese mm/E	Japanese user's manual
544-071*	English mm/E	English user's manual
544-072*	English mm/in	

* To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, D for CEE, DC for CCC, E for BS, F for SAA, K for KC, C and No suffix are required for PSE."

• Panel-mount type display unit, **LSM-5200**:

Order No.	Remarks
544-046	Japanese user's manual
544-047	English user's manual

• Standard calibration gage set (ø20.0, ø160.0): **02AGM300**
• Extension signal cable (max. 25 m)

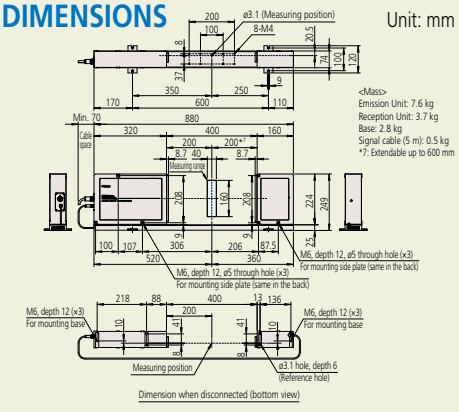
Order No.	Cable length
02AGN780A	5 m
02AGN780B	10 m
02AGN780C	15 m
02AGN780D	20 m

• Extension relay cable (max. 5 m)

02AGC150A	1 m
02AGC150B	3 m
02AGC150C	5 m

DIMENSIONS

Unit: mm



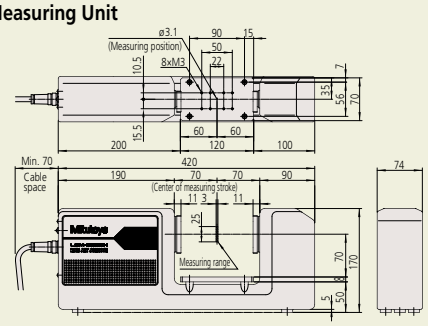
Optional Accessories

- Standard calibration gage set (ø1.0, ø25.0) : **02AGD180**
- Workstage : **02AGD270**
- Adjustable workstage : **02AGD280**

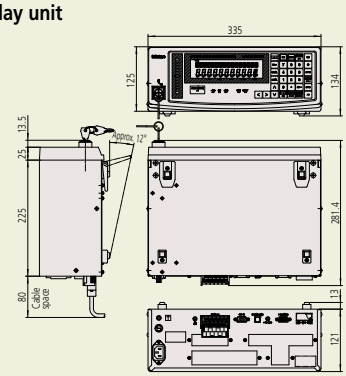
External Dimensions

Unit: mm

Measuring Unit



Display unit

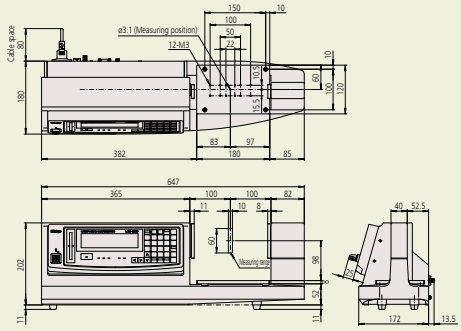


Optional Accessories

- Standard calibration gage set (ø1.0, ø60.0): **02AGD170**
- Adjustable workstage
  Horizontal stroke 200 mm : **02AGD370**
  Horizontal stroke 300 mm : **02AGD680**

DIMENSIONS

Unit: mm



LSM-6902H Measuring Unit and 6900 Display SERIES 544 — 0.1 mm to 25 mm High Accuracy

- Demonstrates the best repeatability available in the 25 mm class.
- The ultra-precise scanning motor enables the highest measurement accuracy to be realized.
- Thanks to excellent linearity, an accuracy of ±0.5 µm over the entire measuring range and a higher accuracy of ±(0.3+0.1ΔD) µm over a narrow range are guaranteed.
- The optimal solution for measuring the outside diameter of pin gages or plug gages.

LSM-6902H

SPECIFICATIONS

Set Order No.		544-497-1	544-498-1*6	544-499-1*6
Measuring unit				
Type		mm	mm	inch/mm
Applicable standards		JIS	IEC, FDA	
Measuring range		0.1 to 25 mm (0.004 to 1.0 in)		
Resolution		0.01 to 10 µm (selectable) (0.000001 to 0.0005 in)		
Repeatability*1	Whole range	±0.045 µm (±0.0000018 in) (ø25 mm)		
	Narrow range	±0.03 µm (±0.0000012 in) (ø10 mm)		
Linearity*2 (20 °C)	Whole range	±0.5 µm (±0.000020 in)		
	Narrow range	±(0.3+0.1ΔD) µm ±(0.000012+0.01ΔD) inch*5		
Positional error*3		±0.5 µm (±0.000020 in)		
Measuring region*4		±1.5 mm×25 mm (±0.006×1.0 in)		
Scanning rate		3200 scans/s		
Laser wavelength		650 nm (Visible)		
Laser scanning speed		226 m/s		
Operating environment	Temperature	0 to 40 °C		
	Humidity	RH 35 to 85 % (non-condensing)		

*1 ±2σ values (σ being the standard deviation) for when ø25 mm and ø10 mm samples are measured for 1.28 seconds (2048 scans on average, 2 samples).
*2 The value at the center of the measuring range.
*3 An error in outside diameter measurement due to variation in workpiece position either in the optical axis direction or in the scanning direction.
*4 The region defined by [optical axis depth]×[scanning width].
*5 ΔD=Difference in diameter between the master gage and workpiece (Unit: mm).
*6 To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, D for CEE, DC for CCC, E for BS, F for SAA, K for KC, C and No suffix are required for PSE.

Display unit

Display	16-digit plus 11-digit fluorescent display, and guide message LED
Segment	1 to 7 (1 to 3, transparent) or 1 to 255 edges
Averaging times	Arithmetic average: 2 to 2048 scans. Moving average: 32 to 2048 scans.
Judgment	Selection from "target value + tolerance", "lower tolerance + upper tolerance", or "7 classes multilimit tolerance zone".
Measurement mode	Standby, Single measurement, Continuous measurement
External dimensions	335 (W) ×134 (H) ×250 (D) mm
Power supply	100 to 240 VAC ±10 % 30 W 50/60 Hz
Standard I/F	RS-232C, Analog I/O
Optional I/F	Digimatic code output unit (2-ch), 2nd I/O analog I/F, BCD I/F
Operating environment	0 to 40 °C, RH 35 to 85 % (non-condensing)
Others	Nominal setting, sample setting, suppression of unnecessary digits, transparent object measurement, automatic measurement in edge mode, output timer, abnormal data elimination, SHL change, group judgment, simultaneous measurement, statistical processing, mastering, buzzer function, automatic workpiece detection (dimension/position), zero-set/offset Note: In the case of dual measuring-unit connection, extra-fine line measurement and some of the communication commands are not available

LSM-9506 Integrated Display/Measuring Unit SERIES 544 — 0.5 mm to 60 mm High Accuracy

- High accuracy of ±2.5 µm, integrated display unit with many functions equivalent to the multi-function display unit. (Some functions may be unavailable.)

SPECIFICATIONS

Order No.		544-115*5	544-116*6
Type		mm	inch/mm
Measuring range		0.5 to 60 mm	0.02 to 2.36 in/0.5 to 60 mm
Resolution		0.05 to 100 µm (selectable)	0.000002 to 0.005 in/0.00005 to 0.1 mm
Repeatability*1		±0.6 µm (±0.00003 in)	
Linearity*2 (20 °C)		±2.5 µm (±0.0001 in)	
Positional error*3	Optical axis direction	±2.5 µm (±0.0001 in)	
	Scanning direction	± (2.0+L/10) µm L: Displacement between workpiece center and optical axis center	
Measuring region*3		±5×60 mm (±0.2×2.36 in)	
Scanning rate		1600 scans/s	
Laser wavelength		650 nm (Visible)*4	
Laser scanning speed		226 m/s (8900 in/s)	
Display unit		16-digit dot matrix (upper column) +7 segment 11-digit (lower column), guidance LEDs	
Standard interface		RS-232C, Digimatic code output unit (1-ch)	
Optional interface		No	
Power supply		AC100 V to 240 V±10 %, 25 W, 50/60 Hz	
Operating environment		0 to 40 °C, RH 35 to 85 % (non-condensing)	

*1 Determined at the level of ±2σ (σ: standard deviation) when measuring ø60 mm in the interval of 0.32 sec. (average 512 times).
*2 Applies at the center of the measuring range when measuring outside diameters.
*3 An error in outside diameter measurement due to variation in workpiece position either in the optical axis direction or in the scanning direction.
*4 FDA Class II (**544-116-1A**)/IEC Class 2 (All models except **544-116-1A**) semiconductor laser for scanning (Maximum power: 1.0 mW)
*5 To denote your AC power cable add the following suffixes to the order No.: D for CEE, DC for CCC, E for BS, F for SAA, K for KC, C and No suffix are required for PSE.
*6 To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, D for CEE, DC for CCC, E for BS, K for KC and No suffix are required for PSE.

Mitutoyo

Laser Scan Micrometer

Non-contact, high-speed, high-precision measurement

LSM-5200 Display Unit
SERIES 544 — Panel-mount Type

- A compact controller which could be used for multi-unit system configurations.
- A panel-mount type display unit designed for the **LSM-S** Series.
- Analog I/O and RS-232C is standard.

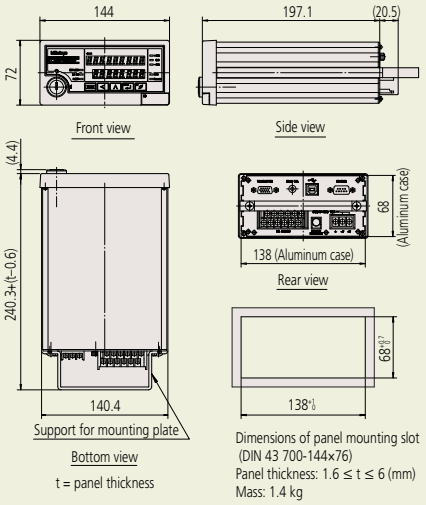
SPECIFICATIONS

Order No.	**544-047**
Display	9-digit (upper) and 8-digit (lower) 7-segment
Segment	1 to 7 (1 to 3, transparent) or 1 to 255 edges*1
Averaging method	Arithmetic average: from 4 to 2048; Moving average: from 32 to 2048 (Arithmetic average is from 16 to 2048 when using **LSM-500S**.)
Judgment	Selecting from "target value±tolerance value" or "lower limit/upper limit".
Measurement mode	Standby, Single measurement, Continuous measurement
Statistical analysis	Calculation result is output via USB or RS-232C.
External dimensions	144 (W) ×72 (H) ×197.1 (D) mm
Power supply	24 V DC±10 %, 1.3 A or more
Standard I/F	USB2.0, RS-232C, I/O analog
Operating temperature (humidity) ranges	0 to 40 °C, RH 35 to 85 % (non-condensing)
Storage temperature (humidity) ranges	–20 to 70 °C, RH 35 to 85 % (non-condensing)
Other functions	Measurement of odd fluted parts, simultaneous measurement, nominal setting, sample setting, selection of unnecessary digits, transparent object measurement*2 Automatic workpiece detection (dimension/position detected)*1, abnormal data elimination, mastering, statistical processing (when using USB, RS-232C), output timer, automatic measurement in edge mode, presetting Note that every function is limited in its combination possibilities. See the user manual for details.
Mass	1.4 kg

*1 The measuring range will be 0.1 mm to 2 mm in the 1 to 255 edge measurement mode or when activating the automatic workpiece detection with **544-531**, **544-532**. Each function has its combination limit.
*2 The measuring range is 50 µm to 2 mm when using **544-531**, **544-532**. For smaller ranges, contact your local Mitutoyo sales office.
Note 1: Cannot be connected to **544-495**, **544-496**.
Note 2: Previous models such as **544-451** cannot be connected.
Note 3: For USB communication with a PC, a dedicated device driver is required. For details, contact your local Mitutoyo sales office.

DIMENSIONS

Unit: mm



LSM-6200 Display Unit
SERIES 544 — Multi-function Type

- 2-axis display unit enables 2 items be displayed simultaneously.
- Statistical operation is supported.
- Capable of statistical analysis such as: average, maximum value, minimum value, range (max. to min.).
- Segment measurement (7 points) or edge measurement (1 to 255 edges) can be selected.
- A function to eliminate abnormal values is standard.
- 100 tolerance values, preset values, or settings can be stored.

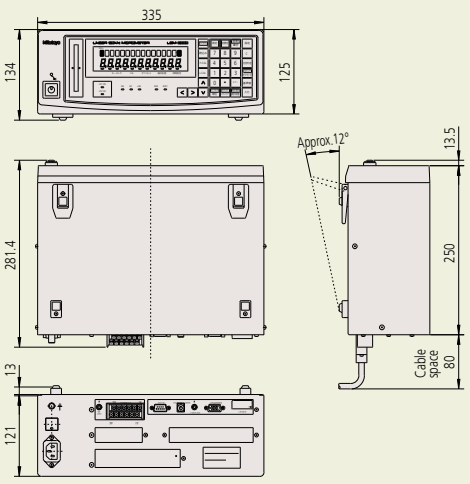
SPECIFICATIONS

Order No.	**544-071**	**544-072**
Type	mm	inch/mm
Display	16-digit dot matrix (upper) and 11-digit 7-segment (lower)	
Segment	1 to 7 (1 to 3, transparent) or 1 to 255 edges*1	
Averaging times	Arithmetic average: per 2 to 2048/Moving average: per 32 to 2048 (Arithmetic average is per 16 to 2048 when using **544-531**, **544-532**)	
Judgment	Selection from "target value+tolerance", "lower tolerance + upper tolerance", or "7 classes multi-limit tolerance zone".	
Measurement mode	Standby, Single measurement, Continuous measurement	
Statistical analysis	Maximum, Minimum, Average, Dispersion, σ (S.D)	
Size	335 (W) ×134 (H) ×250 (D) mm	
Power supply	100 to 240 V AC ±10 %, 45 W, 50/60 Hz	
Standard I/F	RS-232C, Analog I/O	
Optional I/F	Digimatic code output unit (2-ch), 2nd I/O analog I/F, BCD I/F	
Operating environment	0 to +40 °C, RH 35 to 85 % (non-condensing)	
Other functions	Nominal setting, sample setting, selection of unnecessary digits, transparent object measurement*2, measurement of odd fluted parts, automatic measurement in edge mode, output timer, abnormal data elimination, SHL change, group judgment, simultaneous measurement, statistical processing, mastering, buzzer function, automatic workpiece detection (dimension/position)*1, zero-set/offset, dual measurement (optional)	

*1 The measuring range will be 0.1 mm to 2 mm in the 1 to 255 edge measurement mode or when activating automatic workpiece detection with **544-531**, **544-532**. Each function has its combination limit.
*2 The measuring range is 50 µm to 2 mm when using **544-531**, **544-532**. For smaller ranges, contact your local Mitutoyo sales office.
Note 1: To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, D for CEE, DC for CCC, E for BS, F for SAA, K for KC, C and No suffix are required for PSE.
Note 2: Cannot be connected to **544-495**, **544-496**.
Note 3: Previous models such as **544-451** cannot be connected.

DIMENSIONS

Unit: mm



Optional Accessories
SERIES 544 — Laser Scan Micrometer (Measuring Unit)

Standard calibration gage set

- Standard gage set suitable for calibration of Laser Scan Micrometers.
- Nominal gage diameters (1 to 160 mm) are as given in Specifications.

SPECIFICATIONS

For calibrating models		LSM-6902H	LSM-500S	LSM-501S	LSM-503S	LSM-506S	LSM-512S	LSM-516S	LSM-9506
Set No.		02AGD180	02AGD110	02AGD120	02AGD130	02AGD140	02AGD150	02AGM300	02AGD170
Configuration (Order No.)	Stand	02AGD181	02AGD111	02AGD121	02AGD131	02AGD141	02AGD151	02AGM320	02AGD171
	Gages	ø1: 02AGD920 ø25: 02AGD963	ø0.1: 958200 ø2 : 958202	ø0.1: 958200 ø10: 229317	ø1: 02AGD920 ø30: 02AGD961	ø1: 02AGD920 ø60: 02AGD962	ø20: 229730 ø120: 234072	ø20: 229730 ø160: 02AGM303	ø1: 02AGD920 ø60: 02AGD962
	Carrying case	02AGD190	958203	958203	02AGD980	02AGD980	02AGD990	02AGM310	02AGD970

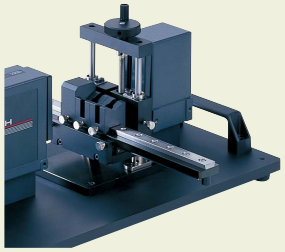
Workstage

- Easy set-up and height adjustment enables high-precision measurement.

SPECIFICATIONS

Model	LSM-501S LSM-503S LSM-6902H
Order No.	02AGD270

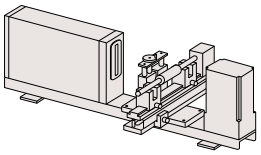
Adjustable workstage



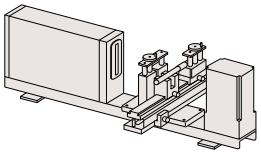
- Vertical/horizontal slide mechanism enables easy measurement of various workpiece diameters.
- Suitable for quality control of high-precision shafts, rollers, pin gages and similar.

Measurement Examples

- Roller of copying machine



- Pin gage or plug gage



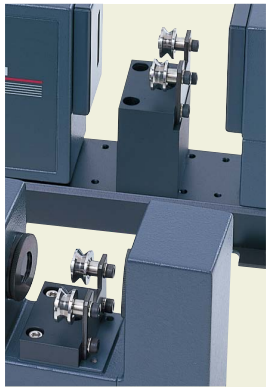
Basic configuration

Basic set	Order No.	Model	Standard Accessories	Measuring range (mm)	Horizontal stroke (mm)	Vertical stroke (mm)
1) Main unit 2) V-block 3) Stop	02AGD280	LSM-6902H	V-block (02AGD420), 2 pcs. Stopper (02AGD430), 1 pc.	0.1 - 25	130	47
	02AGD400	LSM-501S		0.05 - 10	130	32
	02AGD490	LSM-503S		0.3 - 30	200	35
	02AGD520	LSM-506S*	V-block A (02AGD550), 2 pcs.	1 - 60	300	45
	02AGD370	LSM-9506*	V-block B (02AGD560), 1 pc.	0.5 - 60	200	45
	02AGD680		V-block C (02AGD570), 1 pc.	0.5 - 60	300	45

* The stop is not included in the basic set for these models.
Note: Optional part for the adjustable workstage, such as center support, adjustable V-block (up/down) etc., are available.

Guide pulley

- Used for supporting measurement of outside diameter of fine wirelike materials such as magnetic wire or fiber.



SPECIFICATIONS

Model	LSM-500S	LSM-501S
Order No.	02AGD200	02AGD210

Note 1: Each measurement range is as follows:
LSM-500S: ø5 µm to ø1.6 mm
LSM-501S: ø50 µm to ø2 mm

Note 2: For calibration, the calibration gage set for **LSM-500S** (**02AGD110**) is required.

Mitutoyo

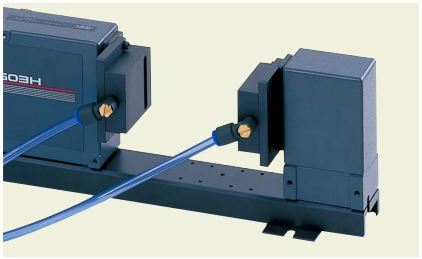
Laser Scan Micrometer

Non-contact, high-speed, high-precision measurement

Optional Accessories
SERIES 544 — Laser Scan Micrometer (Measuring Unit)

Air shield

- Air blows from the air outlet installed on the laser section to clear dust adhering to the laser window.



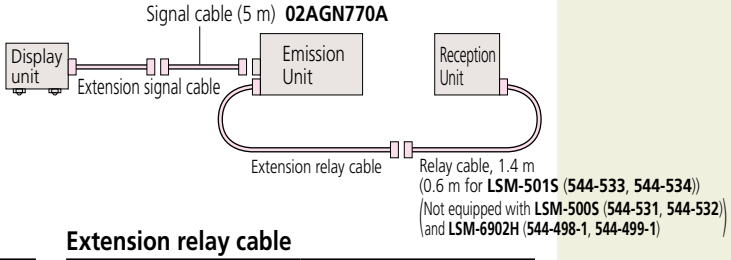
SPECIFICATIONS

Air supply unit	Air shield	Applicable models
957608	**02AGD220**	**LSM-500S (544-531, 544-532)**
	02AGD230	**LSM-501S (544-533, 544-534)**
	02AGD240	**LSM-503S (544-535, 544-536)**
	02AGD250	**LSM-506S (544-537, 544-538)**
	02AGD260	**LSM-512S (544-539, 544-540)**

Note: Air shield is supplied with 5 m air tube (Outside Diameter: 6 mm).

Extension signal cable / Extension relay cable

- Extension signal cables are necessary when the measuring unit and display unit are separated in operation; Extension relay cables are necessary when the optical section is separated in operation.



SPECIFICATIONS

Extension signal cable

Order No.	Cable length
02AGN780A	5 m
02AGN780B	10 m
02AGN780C	15 m
02AGN780D	20 m

Extension relay cable

Order No.	Cable length
02AGC150A	1 m
02AGC150B	3 m
02AGC150C	5 m

Note 1: For **544-531**, **544-532**, **544-533**, **544-534**, the total length of the signal cable and the extension signal cable is 20 m at a maximum.
Note 2: For **544-535**, **544-536**, **544-537**, **544-538**, **544-539**, **544-540**, **544-541**, **544-542** the total length of the signal cable and the extension signal cable is 30 m at a maximum.
Note 3:The length of the relay extension cable is 5 m at a maximum.
Note 4: The maximum extension length of the signal cable and relay cable is 32 m in total.
Note 5: Cannot be used with **544-498-1** and **544-499-1**.

Optional Accessories
SERIES 544 — Laser Scan Micrometer (Display Unit)

Foot switch

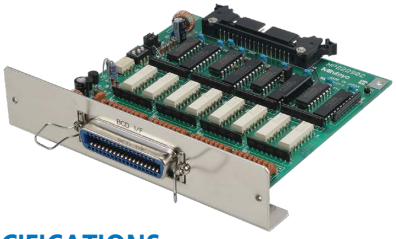
- For **LSM-6200** (**544-071**, **544-072**), **LSM-6902H** (**544-498-1**, **544-499-1**) and **LSM-9506** (**544-115**, **544-116**).

937179T

Optional Accessories
Interface for LSM6200, 6902H

BCD Interface

- Outputs measurement data in BCD output (7-digit) or HEX output.
- Data logic can be switched.
- Isolated I/O circuitry
- Available for **LSM-6200** (**544-071**, **544-072**) and **LSM-6902H** (**544-498-1**, **544-499-1**).



SPECIFICATIONS

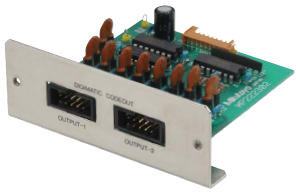
Order No.	**02AGC910**
Standard Accessories	Connector (DDK) **57-30360** (**214188**)

Optional Accessories
SERIES 544 — Laser Scan Micrometer (Display Unit)

Digimatic code output unit

- 2-channel Digimatic code output
- In simultaneous measurement, measurement data are output as follows:
  Program No. 0 to No. 4 in OUTPUT-1
  Program No. 5 to No. 9 in OUTPUT-2
  (10 programs operated)
- 10 pin MIL type connector.
- Output cable is not supplied.
  Connecting cable (optional) 1 m (**936937**)
- Available for **LSM-6200** (**544-071**, **544-072**) and **LSM-6902H** (**544-498-1**, **544-499-1**).

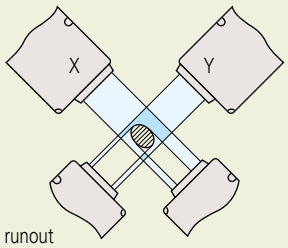
Note 1: Output is 6 digits of measurement data.
Note 2: Displaying 6th and 7th digit after the decimal point is not supported.



SPECIFICATIONS

Order No.	**02AGC840**

XY Measurement



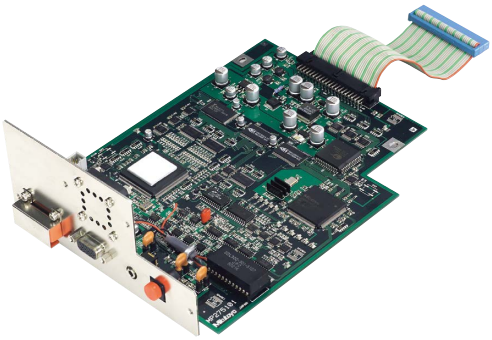
(X–Y): runout
(X+Y)/2: average
Note: XY requires 10 mm-interval.

Dual connection unit

- Enables second unit connection to **LSM-6200** (**544-071**, **544-072**). (both units must be the same model)

Note: Cannot be used for **LSM-6902H** (**544-498-1**, **544-499-1**).

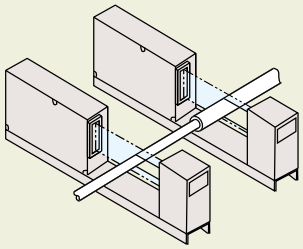
- Depending on the layout of the two measuring units, large-diameter measurement, XY measurement, and parallel measurement are possible.
- Both of the measuring units and display units can be simultaneously operated.



SPECIFICATIONS

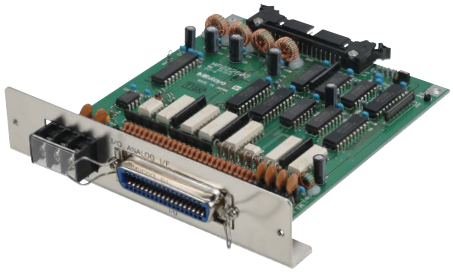
Order No.	**02AGP150**

Parallel Measurement



2nd I/O analog I/F

- I/O, analog output.
- Simultaneous measurement is supported by two pairs of GO/NG judgment outputs.
- Available for **LSM-6200** (**544-071**, **544-072**) and **LSM-6902H** (**544-498-1**, **544-499-1**).



SPECIFICATIONS

Order No.	**02AGC880**
Standard Accessories	Connector (DDK) **57-30360** (**214188**)

Cable for BCD and 2nd I/O simultaneous mount

- Both BCD (**02AGC910**) and 2nd I/O analog I/F (**02AGC880**) can be mounted on **LSM-6200** (**544-071**, **544-072**) and **LSM-6902H** (**544-498-1**, **544-499-1**) using this cable.

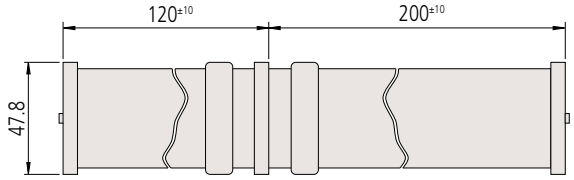
Note: If using this cable, the dual connection unit (**02AGP150**) cannot be used.

SPECIFICATIONS

Order No.	**02AGE060**

DIMENSIONS

Unit: mm



Mitutoyo

Laser Scan Micrometers

Compatibility

Your Laser Scan Micrometer has been adjusted together with the ID Unit, which is supplied with the measuring unit. The ID Unit, which has the same code number and the same serial number as the measuring unit, must be installed in the display unit. This means that if the ID Unit is replaced the measuring unit can be connected to another corresponding display unit.

The workpiece and measuring conditions

Depending on whether the laser is visible or invisible, the workpiece shape, and the surface roughness, measurement errors may result. If this is the case, perform calibration with a master workpiece which has dimensions, shape, and surface roughness similar to the actual workpiece to be measured.
If measurement values show a large degree of dispersion due to the measuring conditions, increase the number of scans for averaging to improve the measurement accuracy.

Electrical interference

To avoid operational errors, do not route the signal cable and relay cable of the Laser Scan Micrometer alongside a high voltage line or other cables capable of inducing noise current in nearby conductors. Ground all appropriate units and cable shields.

Connection to a computer

If the Laser Scan Micrometer is to be connected to an external personal computer via the RS-232C interface, ensure that the cable connections conform to the specification.

Laser safety

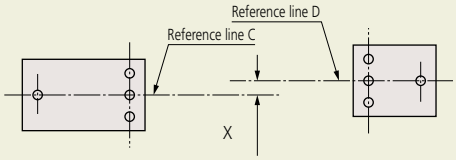
Mitutoyo Laser Scan Micrometers use a low-power visible laser for measurement. The laser is a CLASS 2 EN/IEC60825-1 device.
Warning and explanation labels, as shown below, are attached to the Laser Scan Micrometers as is appropriate.

Re-assembly after removal from the base

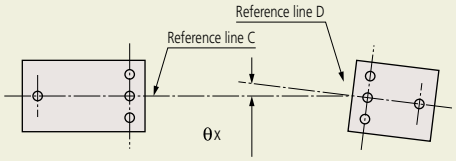
Observe the following limits when re-assembling the emission unit and reception unit to minimize measurement errors due to misalignment of the laser's optical axis with the reception unit.

• Alignment within the horizontal plane

a. Parallel deviation between reference lines C and D:
X (in the transverse direction)

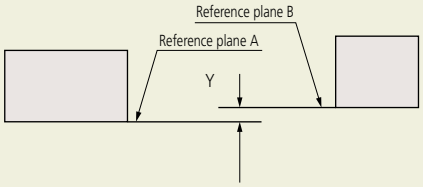


b. Angle between reference lines C and D: θx (angle)

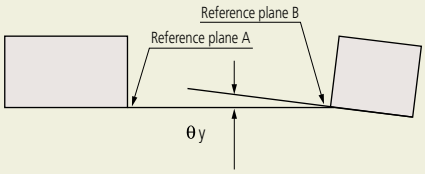


• Alignment within the vertical plane

c. Parallel deviation between reference planes A and B: Y (in height)



d. Angle between reference planes A and B: θy (angle)

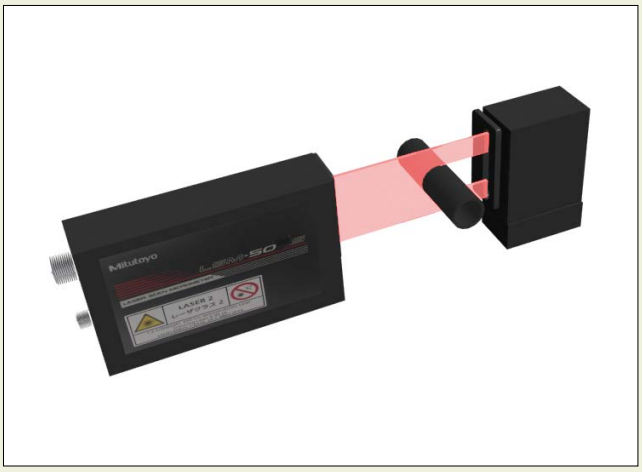


• Allowable limits of optical axis misalignment

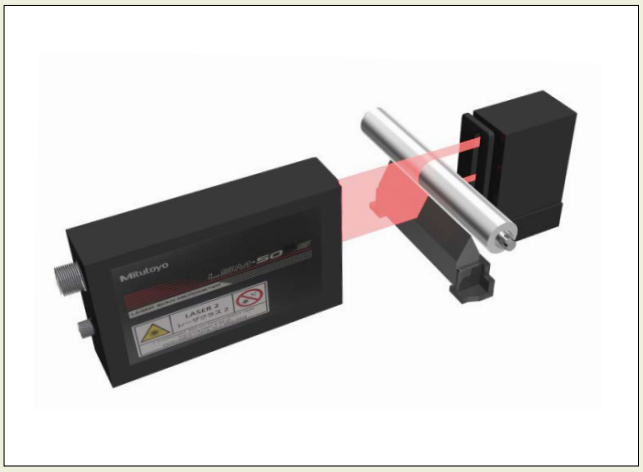
Model	Distance between Emission Unit and Reception Unit	X and Y	θx and θy
LSM-501S	68 mm (2.68 in) or less	within 0.5 mm (0.02 in)	within 0.4° (7 mrad)
	100 mm (3.94 in) or less	within 0.5 mm (0.02 in)	within 0.3° (5.2 mrad)
LSM-503S	130 mm (5.12 in) or less	within 1 mm (0.04 in)	within 0.4° (7 mrad)
	350 mm (13.78 in) or less	within 1 mm (0.04 in)	within 0.16° (2.8 mrad)
LSM-506S	273 mm (10.75 in) or less	within 1 mm (0.04 in)	within 0.2° (3.5 mrad)
	700 mm (27.56 in) or less	within 1 mm (0.04 in)	within 0.08° (1.4 mrad)
LSM-512S	321 mm (12.64 in) or less	within 1 mm (0.04 in)	within 0.18° (3.1 mrad)
	700 mm (27.56 in) or less	within 1 mm (0.04 in)	within 0.08° (1.4 mrad)
LSM-516S	800 mm (31.50 in) or less	within 1 mm (0.04 in)	within 0.09° (1.6 mrad)

Measurement Examples

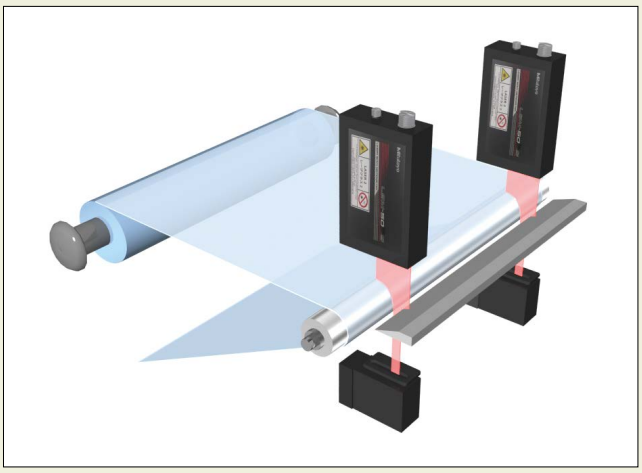
Measurement of outside diameter of rubber roll



Simultaneous measurement of roller outside diameter and deflection

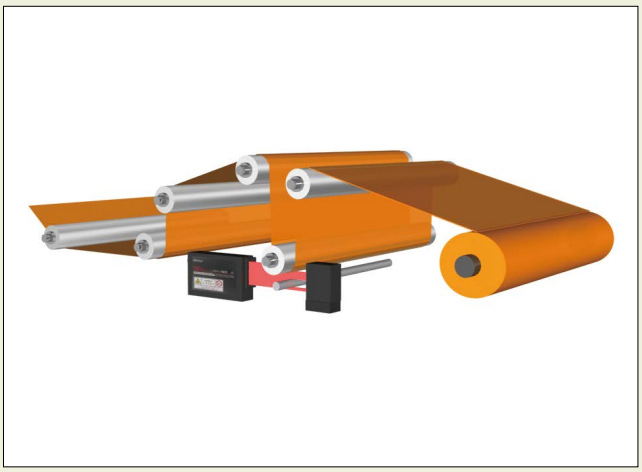


Measurement of uneven thickness of film or sheet (simultaneous measurement)



Measurement of gap between rollers

Measurement of film sheet thickness



Dual system for measuring a large outside diameter